

User's Manual

for

Diagram Consistency and Validation in agentTool III

Submitted by Patrick Gallagher
CIS 895 MSE Project
Department of Computing and Information Sciences
Kansas State University

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Summary of Changes

Version #	Date	Changed by	Summary Log
1.0	March 24, 2006	Patrick Gallagher	Initial draft of document

1. Introduction

This User's Manual is intended to be used with the at3 Validation Eclipse plug-in. It outlines how to use at3 Validation within your at3 Diagrams. The second portion of this manual describes the process of adding new rules to at3 Validation. We have also included a tutorial to add a new rule. This is found in Appendix A.

The following is a list of prerequisites to use at3 Validation within at3 Diagrams.

1. Eclipse 3.1 – found at <http://www.eclipse.org/downloads>
2. GEF 3.1 – found at <http://download.eclipse.org/tools/gef/downloads/>
3. Java 1.5 – found at <http://java.sun.com/j2se/1.5.0/download.jsp>
4. at3Validation 1.0 – available by request
5. at3Diagram plug-ins – available by request (6 plug-ins)

Download all the appropriate versions for your machine. For the GEF plug-in, you may choose to download the package that does or doesn't include the examples.

To install Eclipse, download the 3.1.1 build and unpack the file to an appropriate file on your computer. Within the unpacked Eclipse folder is a folder called plug-ins. Unpack the GEF 3.1, at3Validation 1.0, and the six at3Diagram plug-ins into plug-ins folder. Start Eclipse by selecting `eclipse.exe` in the root Eclipse directory.

Java 1.5 is required only to add rules to the validation library.

For instructions on how to use the at3 Diagram plug-ins, please see the corresponding user manuals for each project.

2. How to Use at3 Validation

The at3 Validation plug-in for Eclipse gives at3 users a way to maintain consistency between their at3 diagrams. A user is given many options on just how they would like to validate their diagrams. All at3 diagrams are validated against other diagrams present in their current at3 project, depending on the rules governing the type of diagram. For instructions on how to use at3 diagrams, please see the at3 Static and Dynamic User Manuals.

at3 Validation comes with a variety of options to use during validation. These include whether or not to validate a project, whether or not to check error problems within diagrams, and whether or not to check warning problems within diagrams. The at3 diagrams are validated using a set of rules that have been defined by Dr. DeLoach and his OMASE Methodology. Each of the rules provides valid and invalid actions in at3 diagrams. An example of an invalid action in the Organizational Model is that each Organizational Model must contain one, and only one Organization component. If at3 Validation is turned on then we are given an error if we have an Organizational Diagram that goes against this rule. We are given an error because the rule defines that an invalid action against this rule denotes an error. We have a wide variety of errors and warnings.

Eclipse uses Problem Markers to report, well Problems, to its users. We must note that validation is only performed on the current diagrams saved to the file system. This means that you must save your changed diagrams before they will be validated. In future releases we hope to change this to be more "real-time" and performing validation when changes are made to the diagram instantaneously. You can see this through invalid Java code in a Java project in Eclipse. If there is a syntax error in your Java code, the Problem is reported to the user through the problems view. at3 Validation is no different. We use this functionality to report Problems back to the user when an invalid action is present within a diagram. The at3 Problem Marker contains a description of the problem, which diagram the problem exists in, and the type of problem, whether it be an error or a warning. It also contains the project that the invalid diagram belongs to.

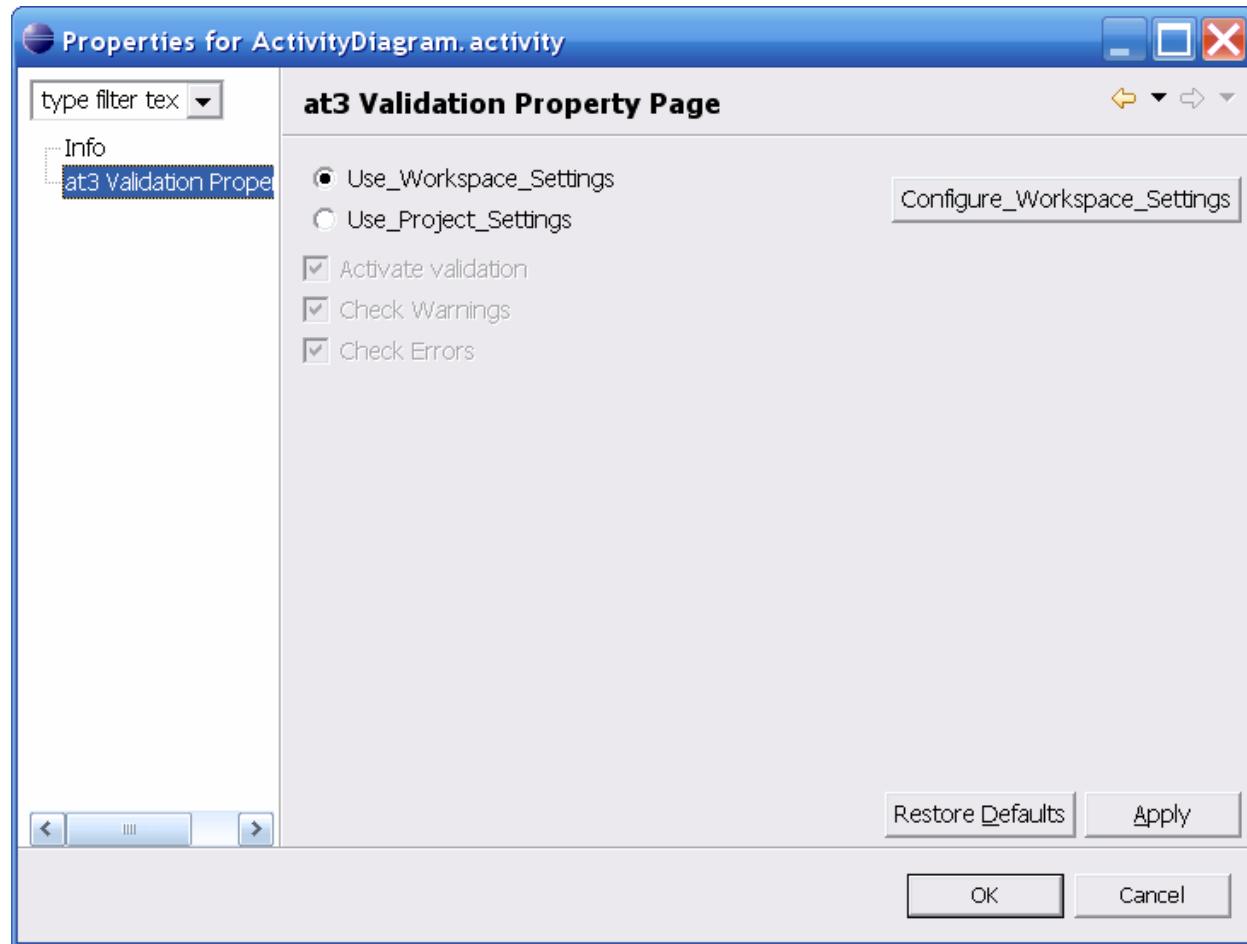
Now that we have a good idea what at3 Validation does, we can delve into how to use it. When we create a new at3 Diagram project, which is for now a new Java Project, the at3 Engine is registered with that project. We can start creating our diagrams within this project and if any of the diagrams contain components that go against our library of rules, we receive problems, viewable in the Problems View. An example of how to get a Problem Marker is to

create a new Activity Diagram. This will create an error problem because one of our governing rules is that all Activity Diagrams must be represented in an Agent Diagram as a Service component. In the following sections we will cover what features accompany our validation engine.

2.1. Workspace vs. Project Specific Preferences

Within at3 Validation we are given the liberty to chose either global or project specific properties with certain preferences. We can decide if we want to follow the global settings for each project or whether we want a specific project to follow its own set of preferences. We will first discuss the preferences that pertain solely to the global workspace.

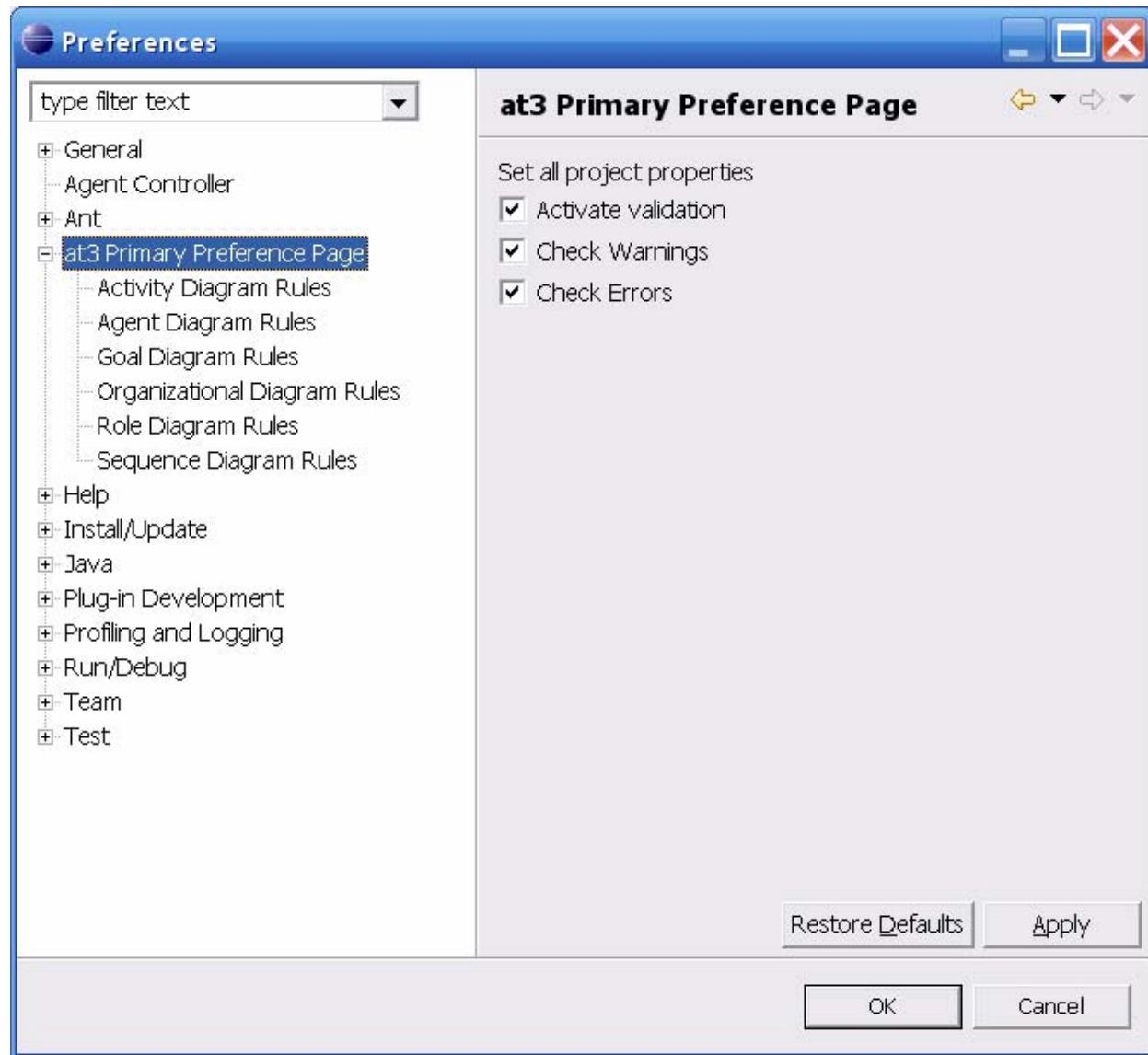
In order to open a projects preference page through a resource we must first highlight the resource. With at3 Validation, the resource must be a diagram file. We filter all other out by checking the files extension and see if it is a correct file type for validation. Right-click the at3 diagram and select Properties at the bottom. This opens a preference page for us. We see at3 Primary Preferences Page in the right panel of the window. Highlight it. We now see this:



We have the choice to set the preferences according to either the global workspace settings or to use project Specific Settings. If we elect to configure the workspace settings, we only are allowed to edit the three main preferences Activate Validation, Check Warnings, and Check Errors. This is because, as we discussed earlier, the other preferences are only editable by choosing the preferences through the Window→Preferences path. If we select the Use Project Settings button, the Use Workspace Setting button is now disabled. We discuss the purpose of each of these options later in section **Project Specific and Global Workspace Preferences**

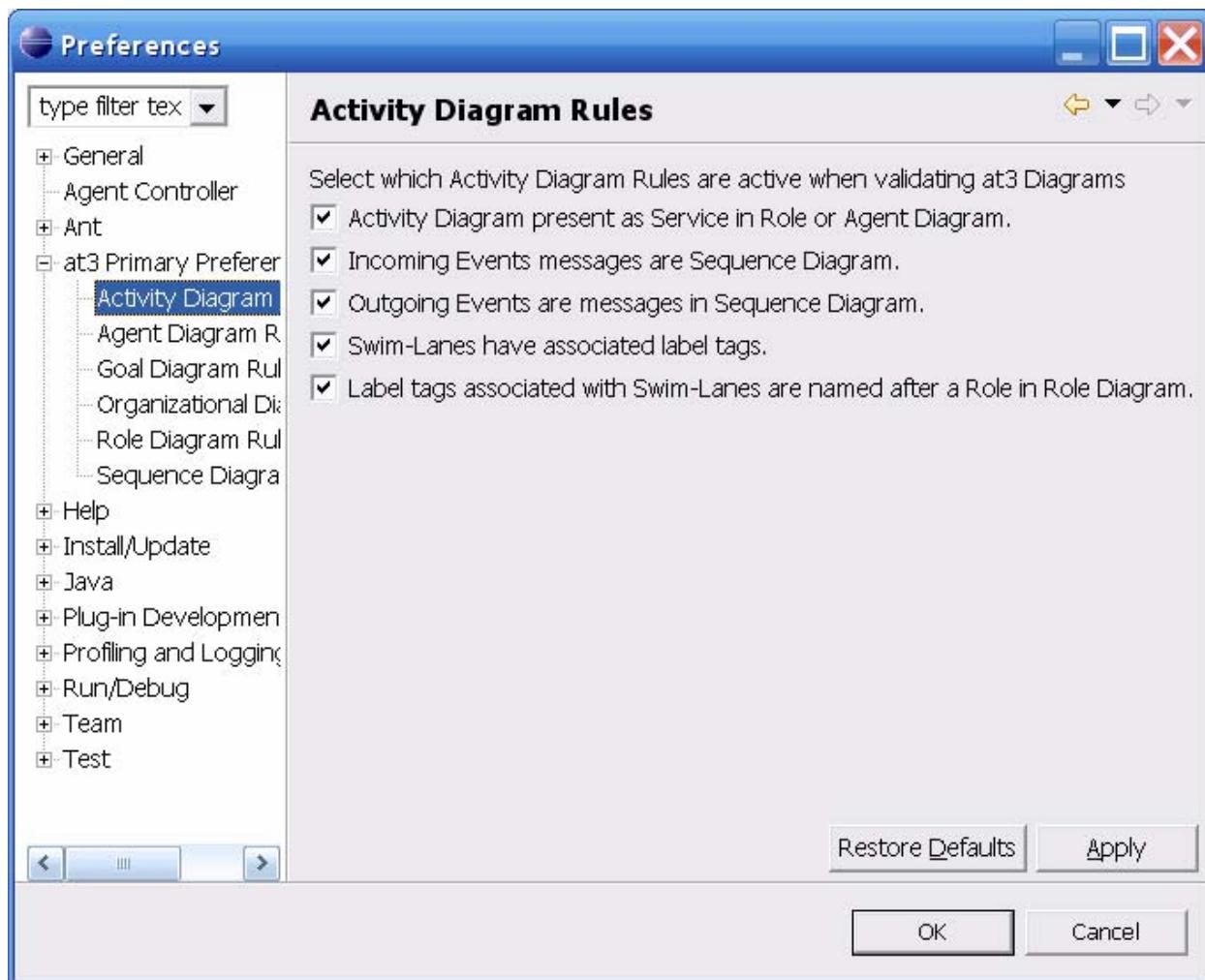
2.2. Workspace Preferences Only

Workspace or global preferences are accessible through the Eclipse preference store. We can modify these settings by selecting Window → Preferences... in the Eclipse tool bar. Doing so gives us a window similar to the one below.



As you can see we have a section called at3 Primary Preference Page. This contains subheadings to set more specific preferences. We will discuss these subheadings first, making our way back to the primary preference page later.

All of the sub preference pages have the same functionality so we will only discuss the first one, Activity Diagram Rules. The following figure shows this preference page.



As you can see, we currently have five rules primarily associated with the activity diagram. Deselecting any of these settings will ‘turn off’ any reporting of this problem to the user. For example, if we don’t care to see an error when an Activity Diagram is not present as a Service in an Agent Diagram within the same project, we would deselect the box next to this rule. Doing this deactivates that rule and when a diagram that contains this problem is found, it is not reported to the user. These preferences are only valid in the global settings and not available as project specific settings. This means that if we chose to use the validation engine this way, we must use the global settings on our project.

2.3. Project Specific and Global Workspace Preferences

Here we have Activate Validation, Check Warnings and Check Errors. If we have an option activated on a project but the workspace settings are deactivated, we will still perform the selected actions on the project because the project specific preferences tell us to.

When checked, these options are active, meaning that if checked we will perform validation, including all warnings and errors on all projects set to the global preferences. If we uncheck Activate Validation, then all projects that are set to the global preferences will not be validated and the user will not be notified of any invalid diagrams. If we uncheck Check Warnings, then all projects that are set to the global preferences will not report warnings back to the user but all errors will be reported, so long that validation and Check Errors are active. The same goes for errors as with warnings. Deselecting Check Warnings and Check Errors has the same end result as deselecting Activate Validation, although it is advisable to deselect Activate Validation if this is wanted.

2.3.1. Activating/Deactivating Validation

As stated above, we can choose which of our projects we wish to perform validation on. This means that if we have two at3 projects in our workspace then we chose to active validation on either project or both or neither. This value is set as a project preference. We have the choice to include a project in our global preferences. If we choose to deactivate validation within the project specific settings, that project will not be validated.

If a project is set to follow the workspace settings, then it will either be active or inactive based on the global setting.

2.3.2. Checking Warnings/ Checking Errors

The Check Warnings/ Check Errors option is available so that we may be able to validate our diagrams, ignoring or including certain type of problems. If we would want to ignore warnings on our project, then we simply deselect this option in our preference page. We can mix and match preferences for each project and doing so has no effect over the next, so long as the project is not set to follow workspace settings.

3. How to Create New at3 Validation Rules

To make adding a new rule easy on users, we now created a diagramRule extension. Most features in Eclipse are available through extensions. This extension allows the user to provide essential information about the new rule, which is gathered through either a wizard page, which in itself is an extension point (Method 1) or through direct, manual creation (Method 2) and contribute the basic logic behind the rule. Once this is done, the rule will be apart of validation package. In the following sections we describe just how to add new rules to the at3 Validation plug-in. To create new rules we have two options. The first is referred to as Method 1 – Wizard Usage and the other is Method 2 – Manual Creation. Both of these require that once complete, the user sets the appropriate preferences. This is outlined in the section **Setting Preference Store Values**.

3.1. Method 1 – Wizard Usage

In this section we will walk through how to create a new at3 Validation rule using the extension's wizard page.

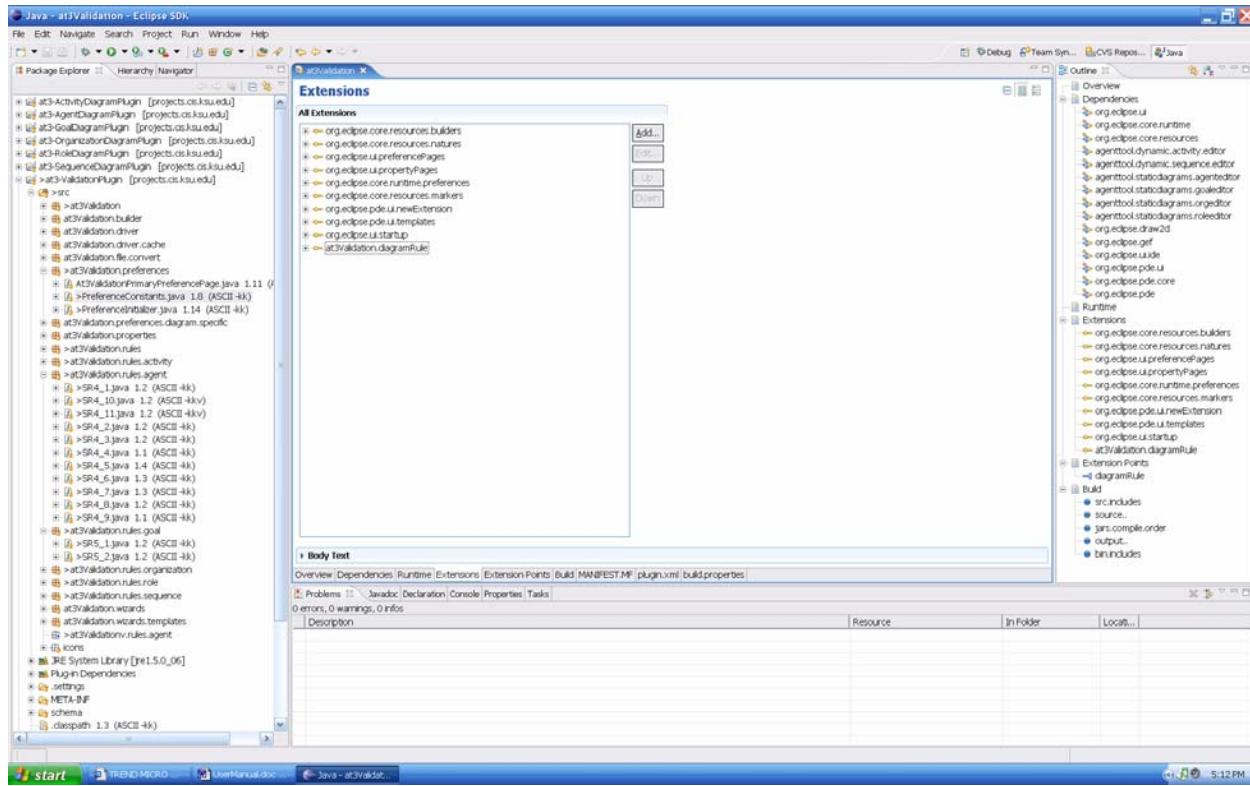
Prerequisites

The user must have access to the at3 Validation plug-in source code.

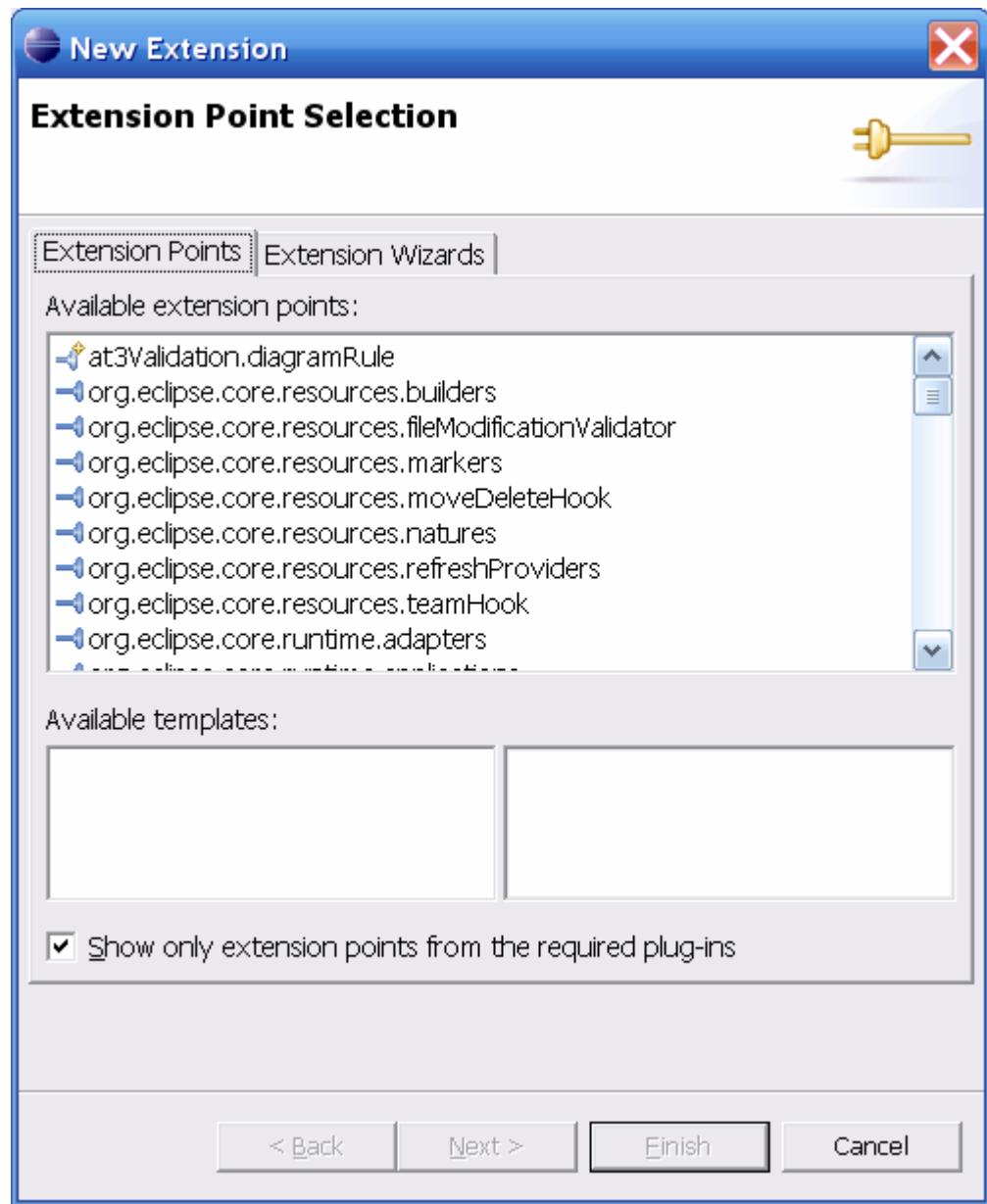
The user must have the at3 Validation plug-in .jar file placed in the plug-ins folder in the Eclipse HOME directory.

The user must have at3 Validation project open in the workspace.

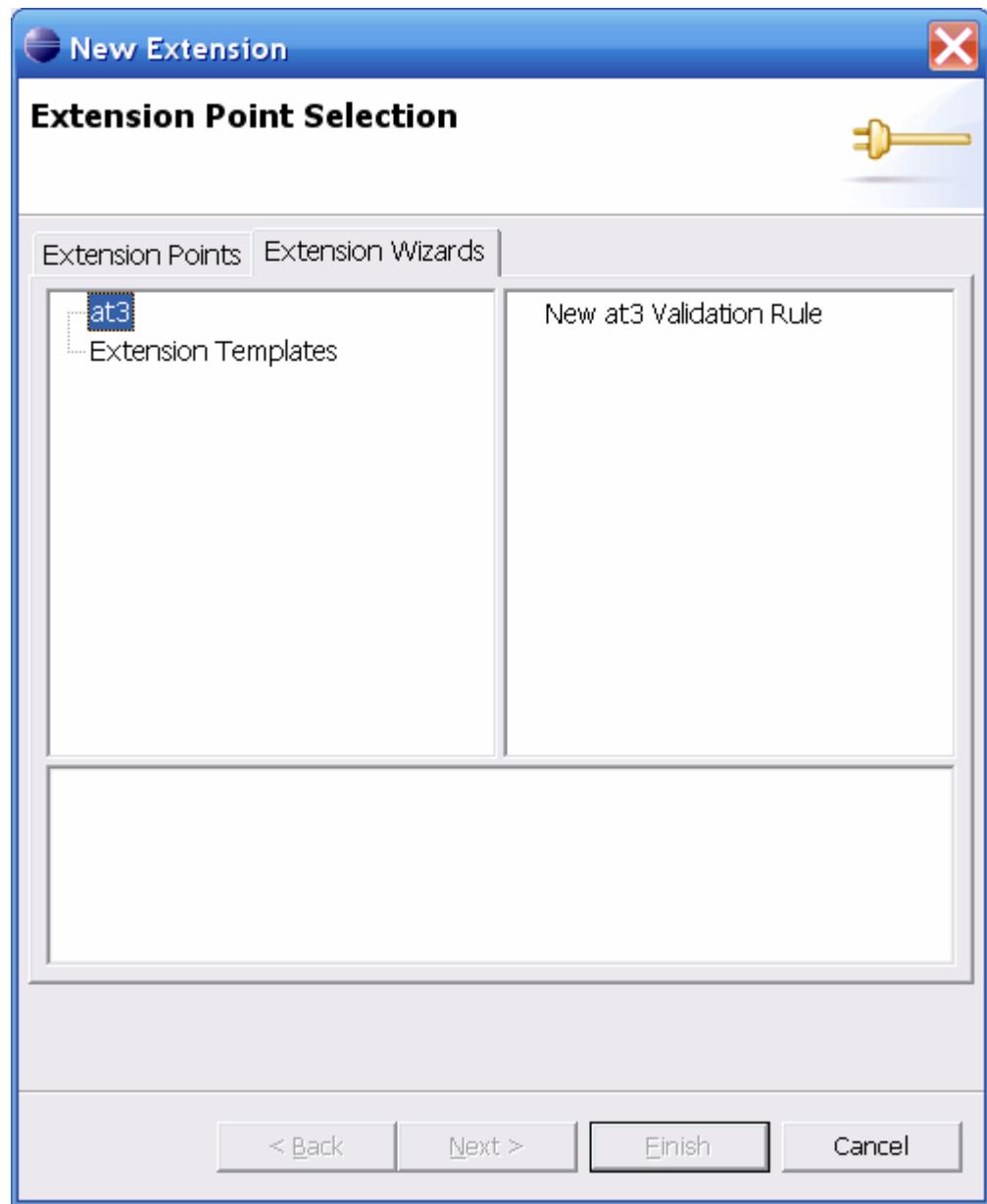
Once the user has satisfied all of the prerequisites, we must expand at3 Validation plug-in project. Located in the project is the plugin.xml file. Select plugin.xml and open it in the editor view.



Select the Add... button next to the All Extensions box. This will bring up a list of all available extensions.



Select the Extension Wizards tab at the top of this page and then highlight at3, as shown.

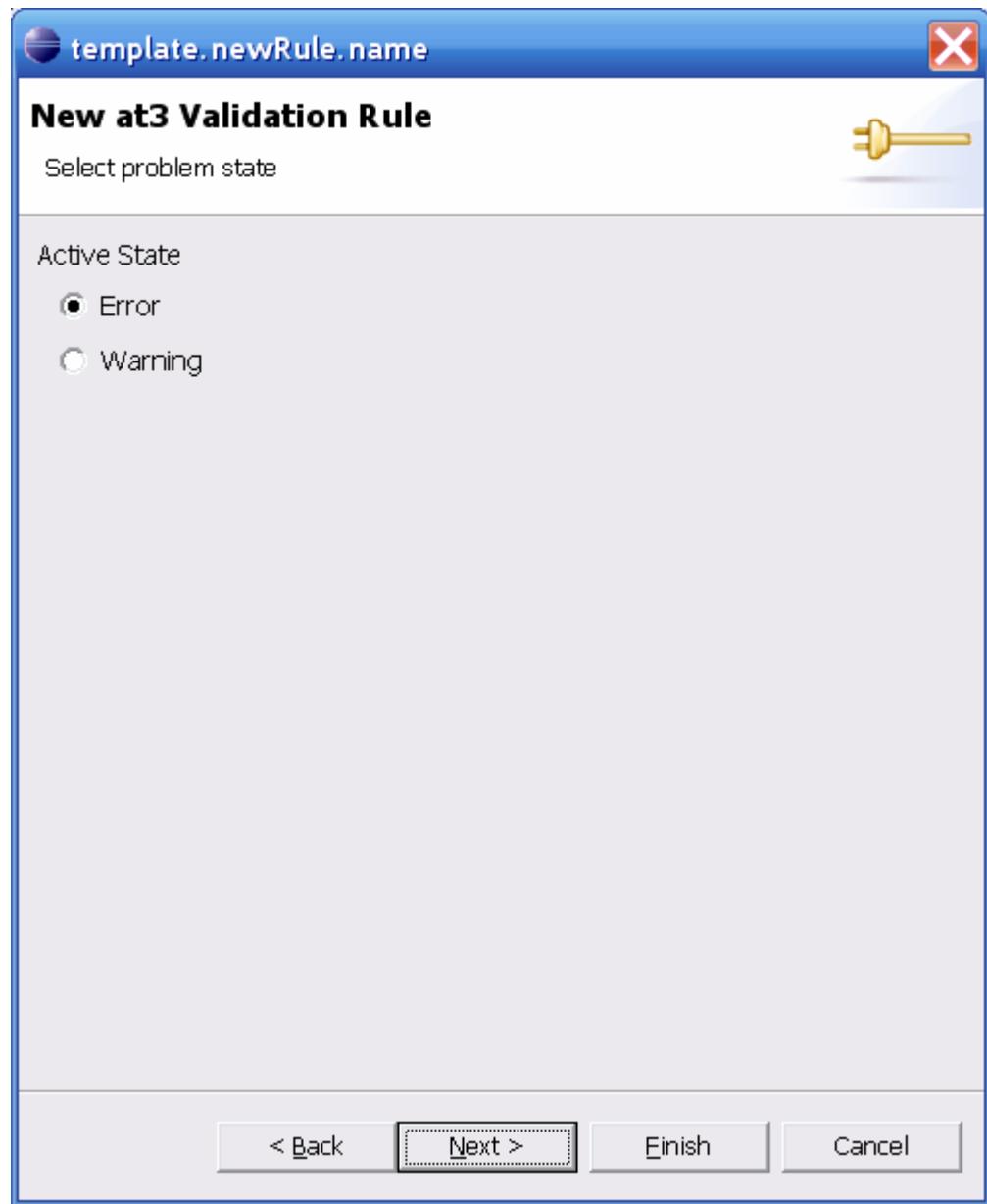


The “New at3 Validation Rule” is now visible in the right frame. Select this and press Finish. Insert the name of your new rule in the next page and select Next.

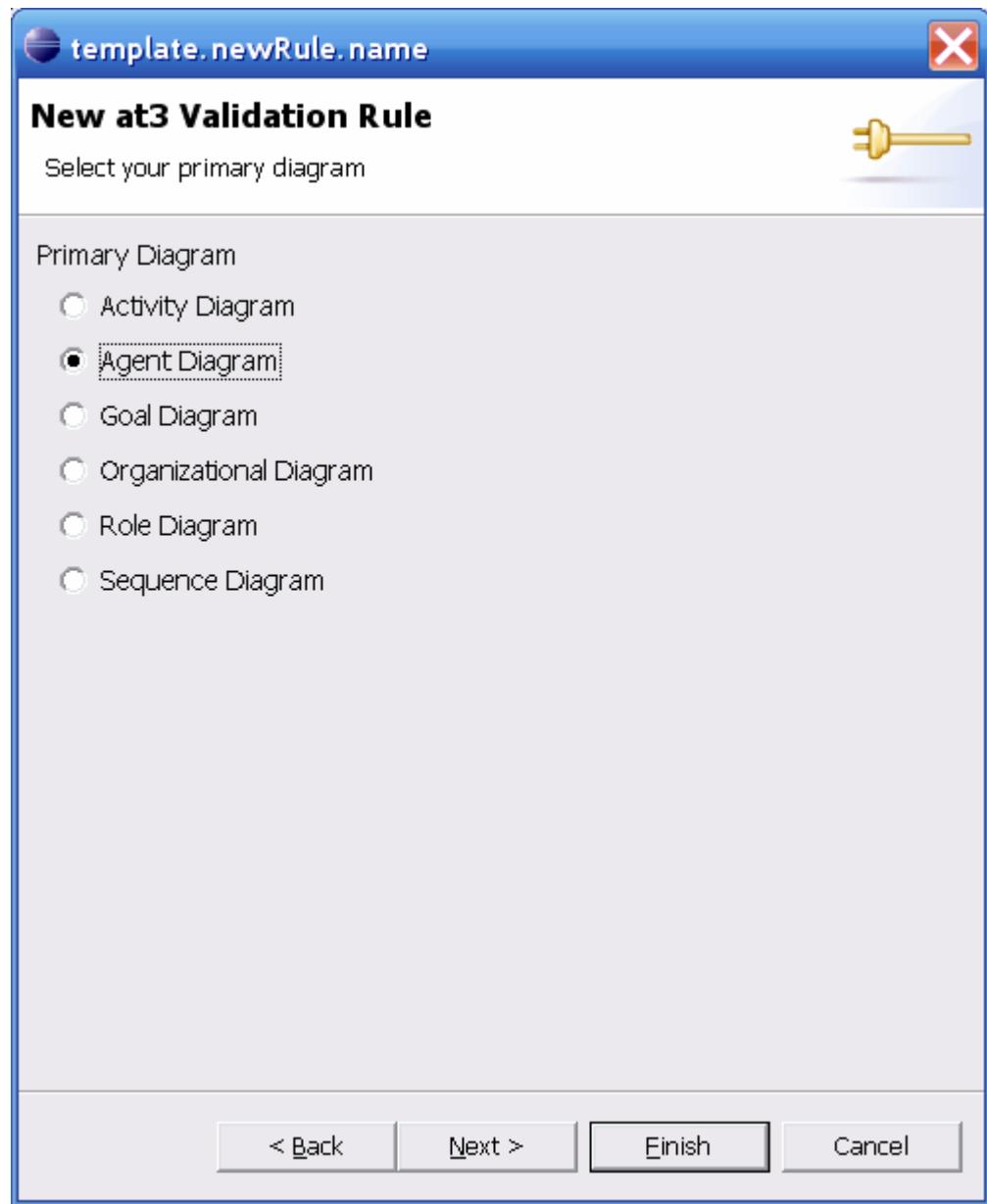


It is recommended to follow the naming scheme XX.YY where XX is an identifier and YY is a short, one word descriptor. They are separated with a (.). You are not required to follow this format.

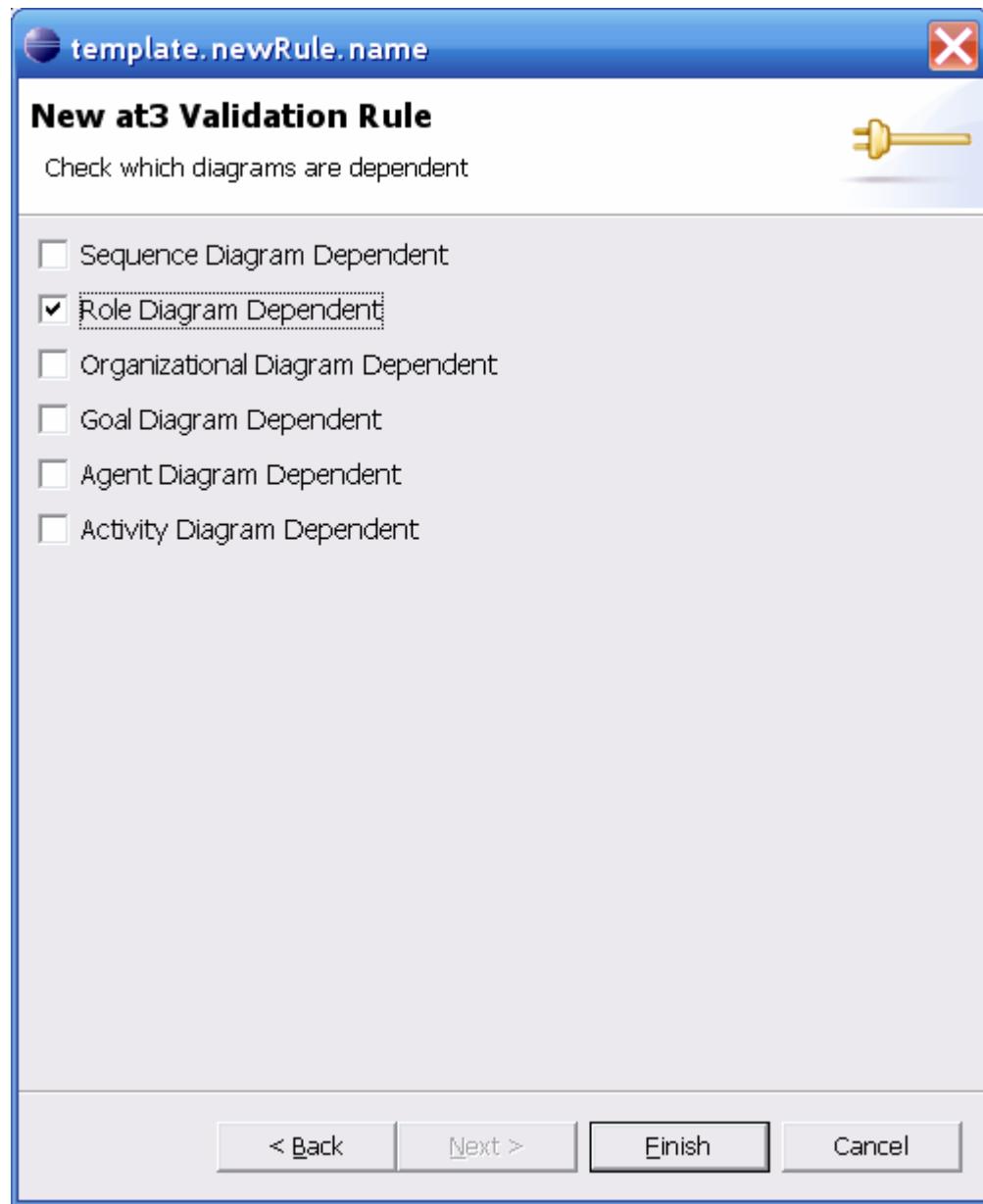
Select whether the rule is of type error or type warning.



Select Next and select the primary diagram type. This is the diagram that the rule is associated with.

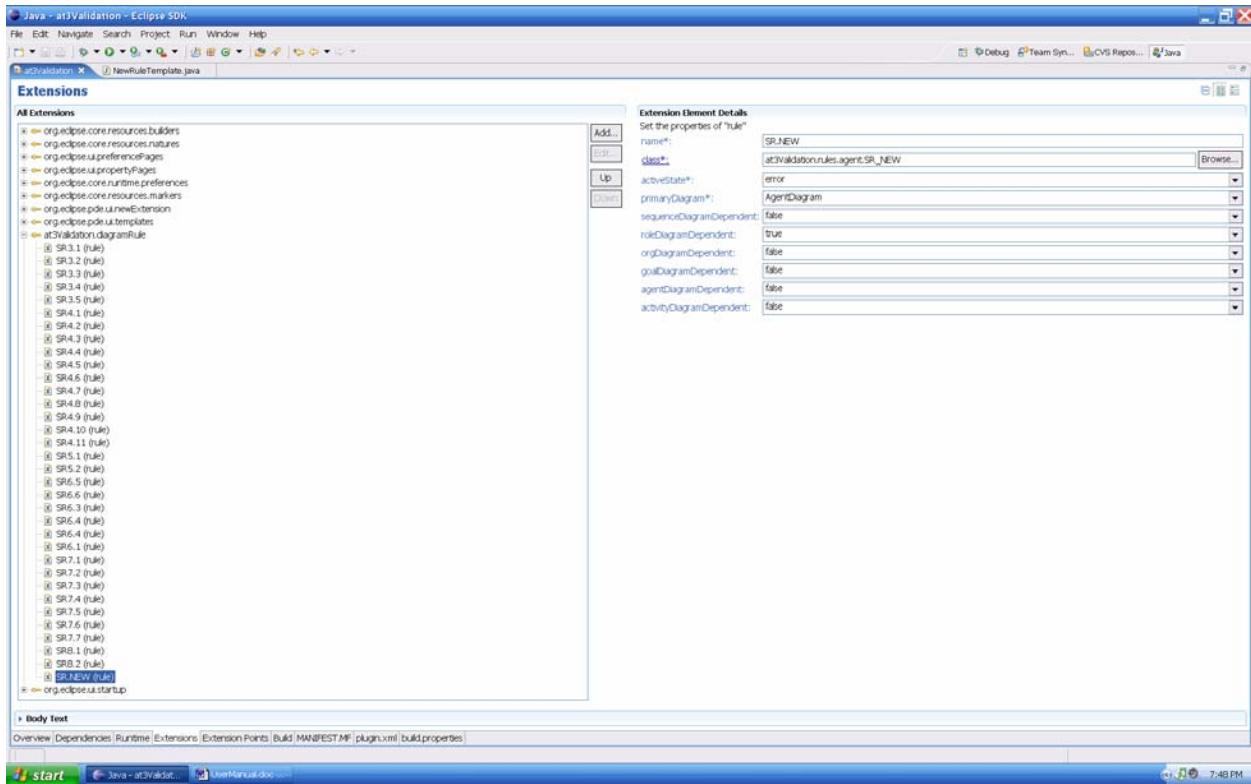


Select Next and check the boxes that correspond to the other diagram types this rule is associated with.

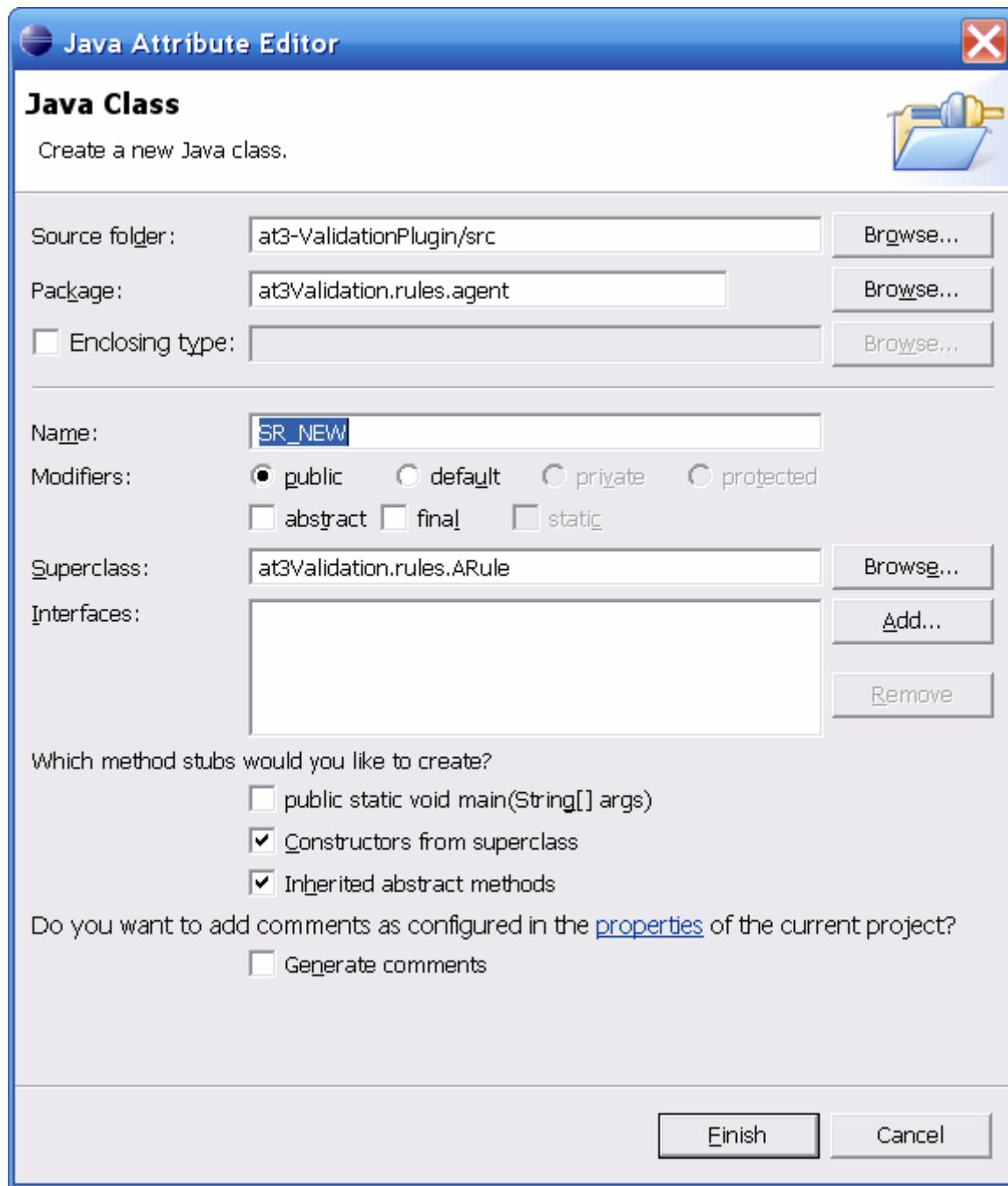


Select Finish. If you do not complete all pages of the wizard, you can go back and follow the steps in Method 2 of rule creation to file in the missing details.

Once you click Finish, your new rule extension is placed under the at3Validation.diagramRule extensions in the plugin.xml page. The figure below shows this.



Verify that the properties on the right are correct. Notice that your new rule's class is pointing to a new class located in the rules folder. The location of the rule in rule's folder depends on your type of primary diagram. In this case it is located in the at3Validation.rules.agent package. This is the fully qualified location of the class that will implement your rule but in order to create the class you need to select the class*. link next to the location. Doing this brings up a new wizard that will create your class.



Notice that the Superclass is at3Validation.rules.ARule. This is need by all rules for validation. Everything should be correct so select Finish. Your new class will be opened for editing in Eclipse.

There are four methods that Eclipse places in our definition because we extended ARule, which implements IRule. Outlined below is a description of each method.

Method	Description
Constructor	Default and nothing needs to be changed.
run()	Here is what needs to be done to validate the rule
getActiveState()	Returns whether or not our rule is actively set to be ran
	during validation. This is based on a property with our preference store.
getProblemState()	Returns whether or not we are validating the type of
	problem associated with this rule

To see an example of how to implement these methods, view another rule provided with the plug-in, say SR4.1.

We have now created a new rule. We now need to set up the preferences, outlined in the section **Setting Preference Store Values**. To implement the rule, see the section implementing the run Method is Rules.

3.2. Method 2 – Manual Creation

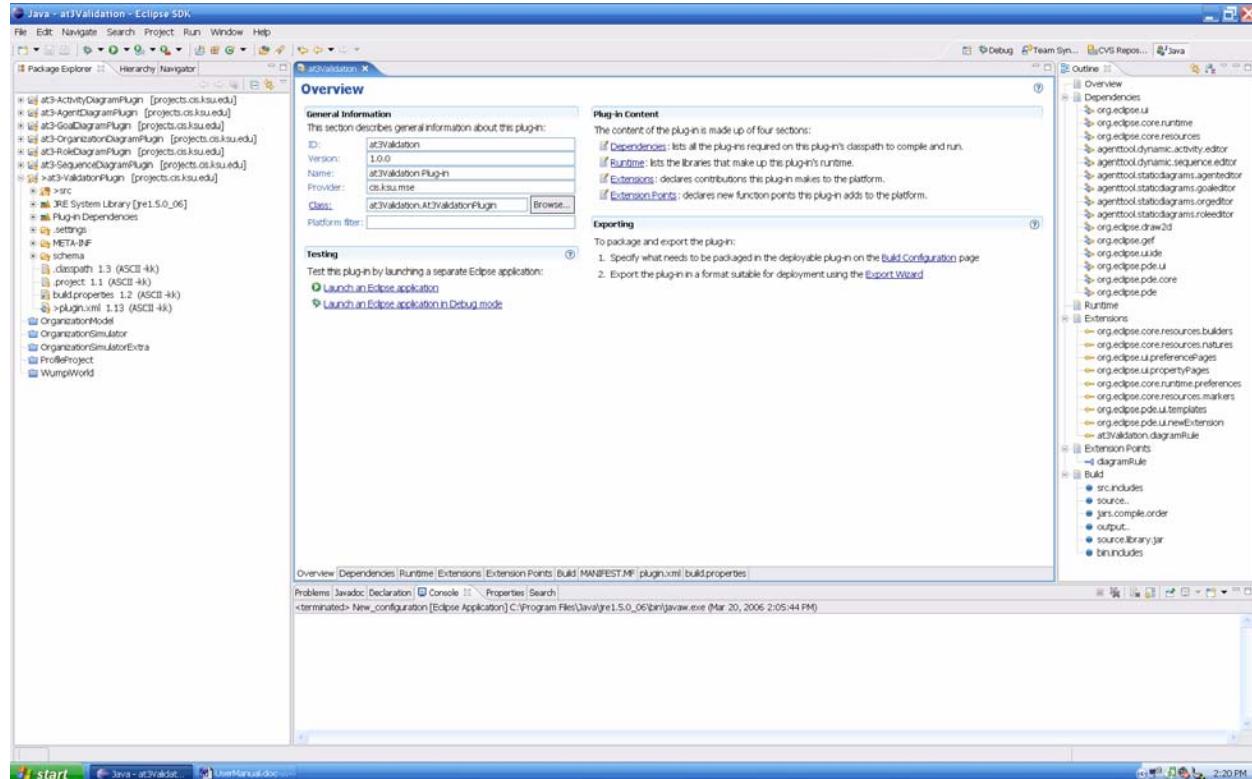
In this section, we will walk through how to create a new at3 Validation rule using the extension point schema.

Prerequisites

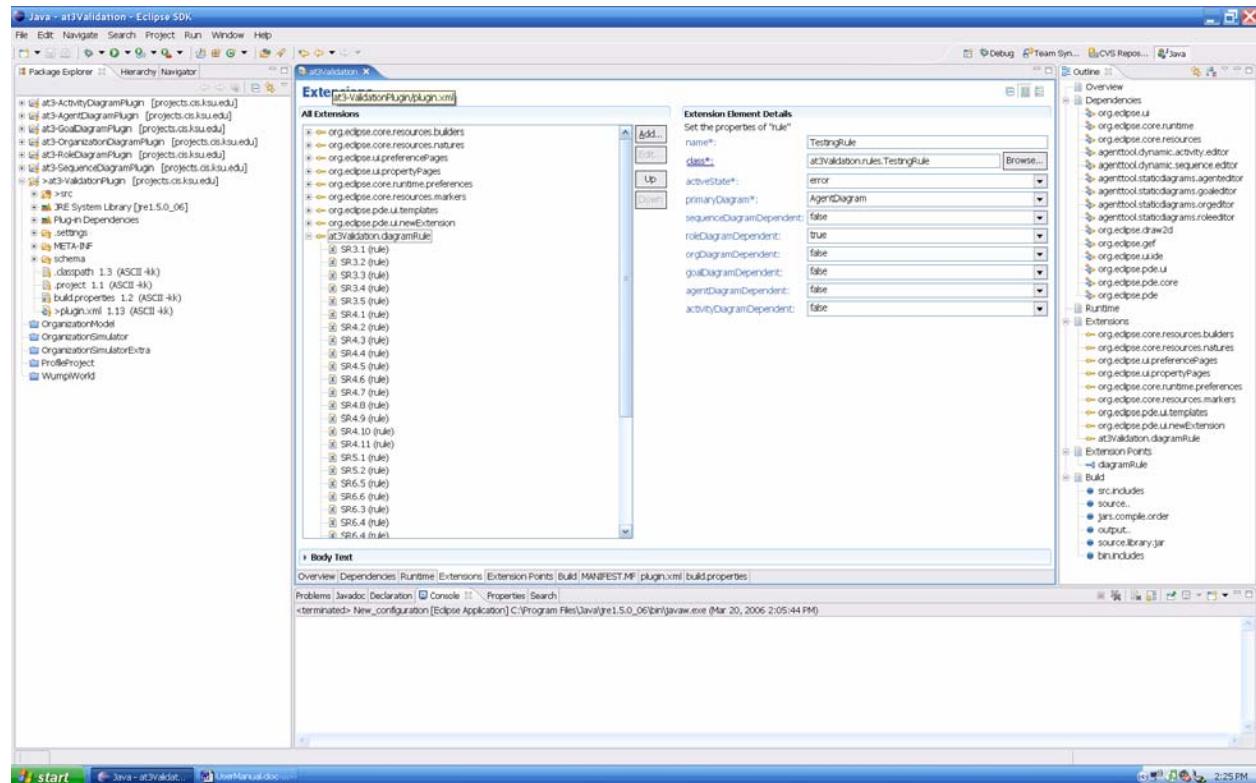
The user must have access to the at3 Validation plug-in source code.
The user must have at3 Validation project open in the workspace.

Creating New Extension Point

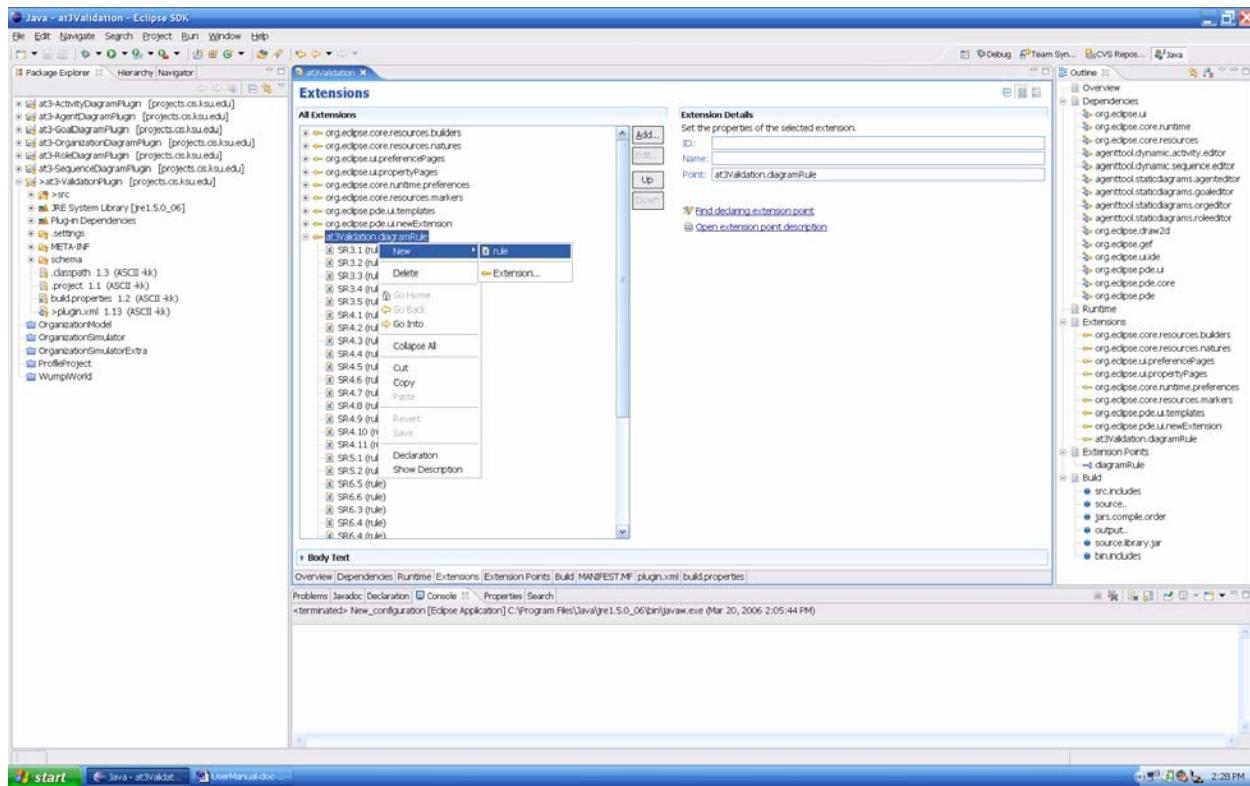
Once the user has satisfied all of the prerequisites, we must expand at3 Validation plug-in project. Located in the project is the `plugin.xml` file. Select `plugin.xml` and open it in the editor view.



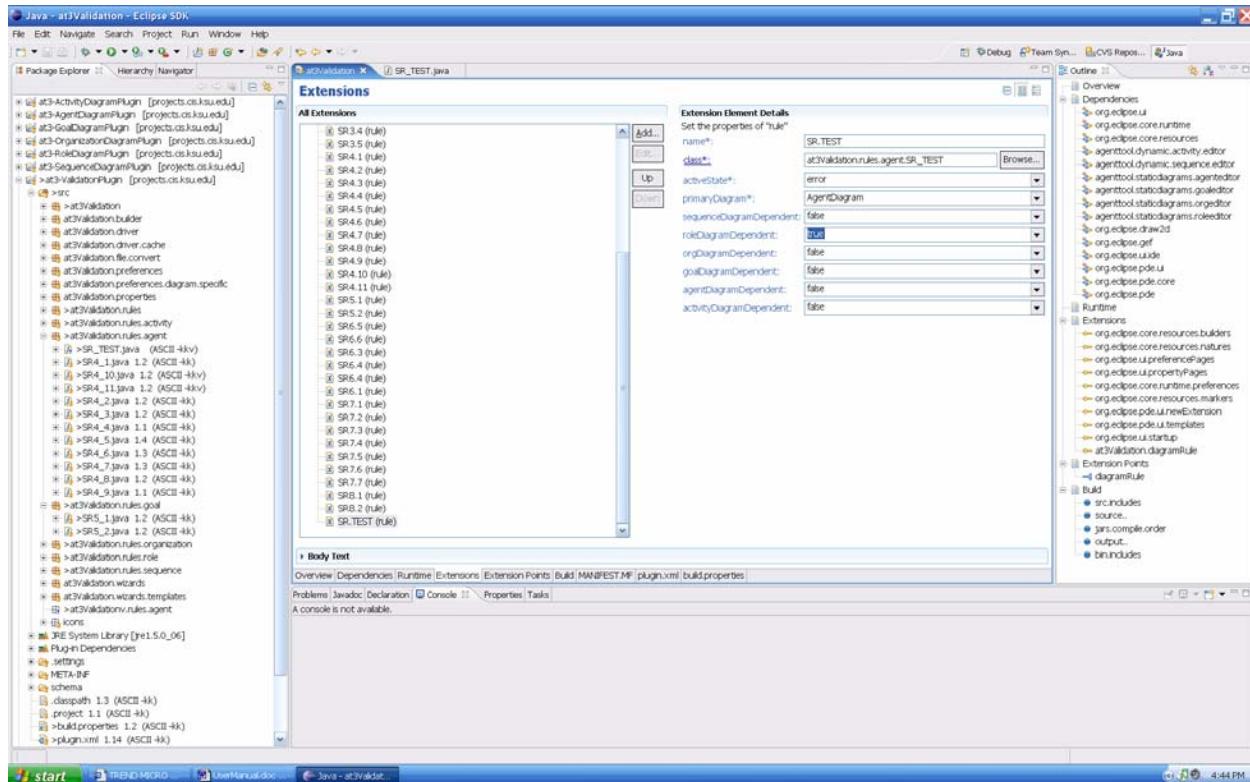
Located along the bottom of the editor view is a set of tabs. Select the ‘Extensions’ tab to open it in the editor view. Once this is done, expand the at3Validation.diagramRule tree in the ‘All Extensions’ section. All of the extension points based on the ‘...diagramRule’ extension are the current rules within at3Validation.



Right click on ‘at3Validation.diagramRule’ and select New->Rule.



A new extension rule is added to the end of our rules. We now have some properties for this extension point that we need to set. These properties are visible in the ‘Extension Details’ section of the plugin.xml editor.



Below is a table describing the properties for an at3 Validation Diagram Rule.

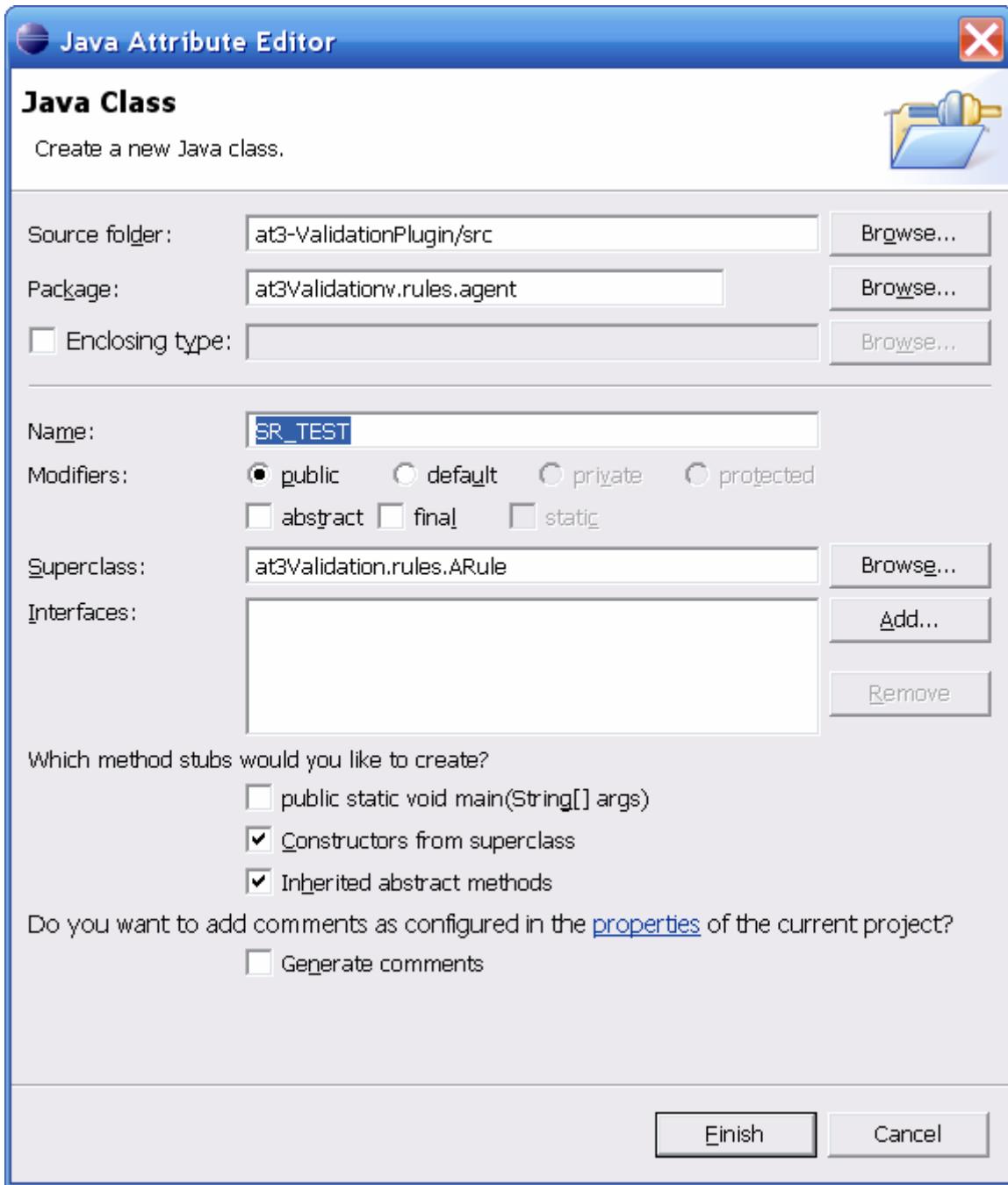
Property	Description
name	The name of the rule
class	The fully qualified class location the rule implements
problemType	The type of problem created within Eclipse (Error, warning)
primaryDiagram	The primary diagram type associated with this rule
SequenceDiagramDependent	Does it involve the sequence diagrams?
roleDiagramDependent	Does it involve the role diagrams?
orgDiagramDependent	Does it involve the organizational diagrams?
goalDiagramDependent	Does it involve the goal diagrams?
agentDiagramDependent	Does it involve the agent diagrams?
activityDiagramDependent	Does it involve the activity diagrams?

The name of the rule must be the same that will be stored in Eclipse's preference store. The class is the implementing class used to perform the logic of rule validation. The problemType gives us the Problems category that the rule will violate. This is either an error or a warning. The primary diagram is the type of at3 Diagram that corresponds to the type of at3 Diagram associated with this rule. Every rule has one type of diagram that when the diagram has changed, the rule must be run on those types of diagrams. The '...diagramDependent' properties are those at3 Diagrams that are check for consistency with the primary diagram. All or none of these may be true or false.

For example if I have a rule that states "All roles in an Agent Diagram must also be in a Role Diagram. This is reported as an error.", then the primary diagram would be the Agent Diagram and the rule is also dependent on Role Diagrams. The rest of the diagramDependent values are false. The problemType would be an error.

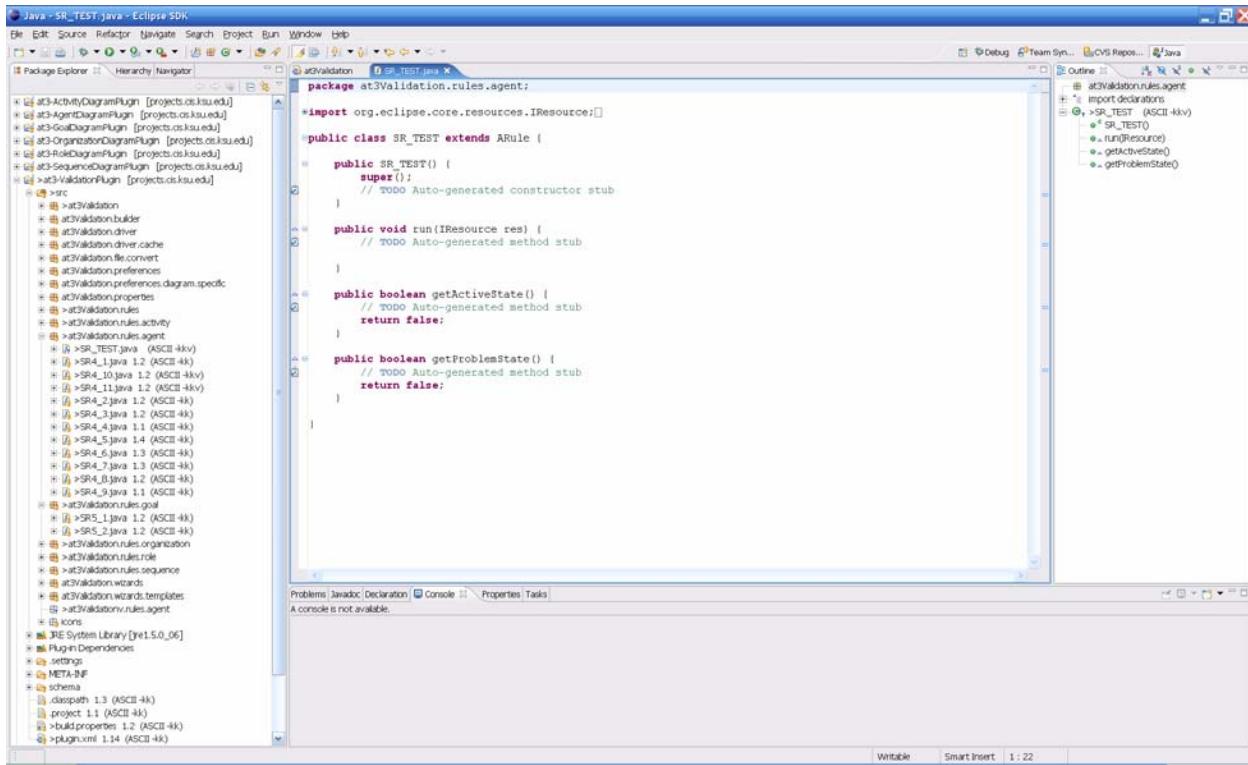
When implementing a class, change the name property of the extension point to the appropriate name. An example name would be SR.TEST. For consistency, we need to name our class after the name of our rule. So, the fully qualified class for the new rule would be at3Validation.rules.agent.SR_TEST. Notice that we replaced the (.) with an (_). This is the only difference.

Now, to create the class, select the class*. link next to the class property. This brings up a wizard to create a new class definition that extends ARule.



Use the default values and select Finish.

This then opens up a new rule definition class for us to complete our rule's logic that is performed during validation. The required



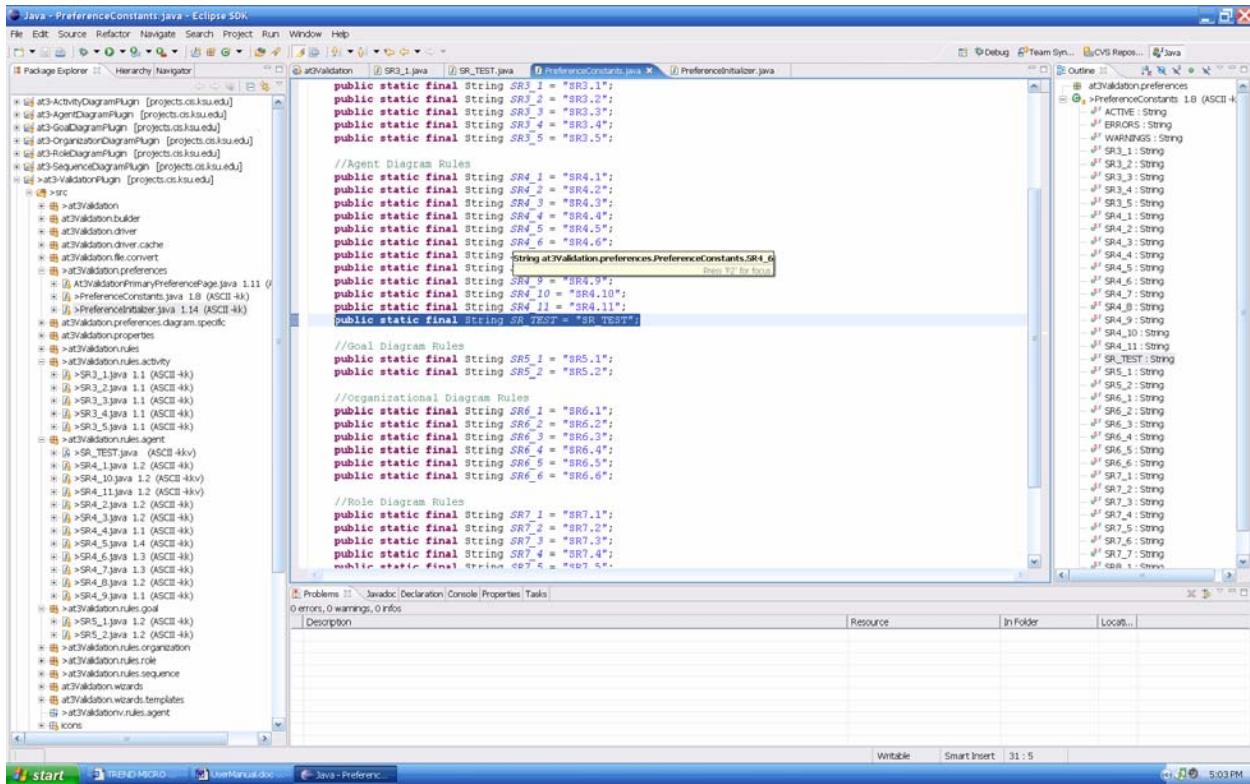
There are two methods that Eclipse places in our definition because we extended ARule, which implements IRule. Section **Implementing the run() Method is Rules** gives instructions on how to implement the run() function.

3.3. Setting Preference Store Values

Once the basic structure of the rule is completed using either Method 1 or Method 2, the user must create and set the values within the preference store. To do this open the class PreferenceConstants.java located in at3Validation.preferences. This is where we create a value for our new rule in Eclipse's Preference Store. Using the name given to you new rule, find the primary diagrams section in the class and add the line

```
public static final String <VARIABLENAME> = "name";
```

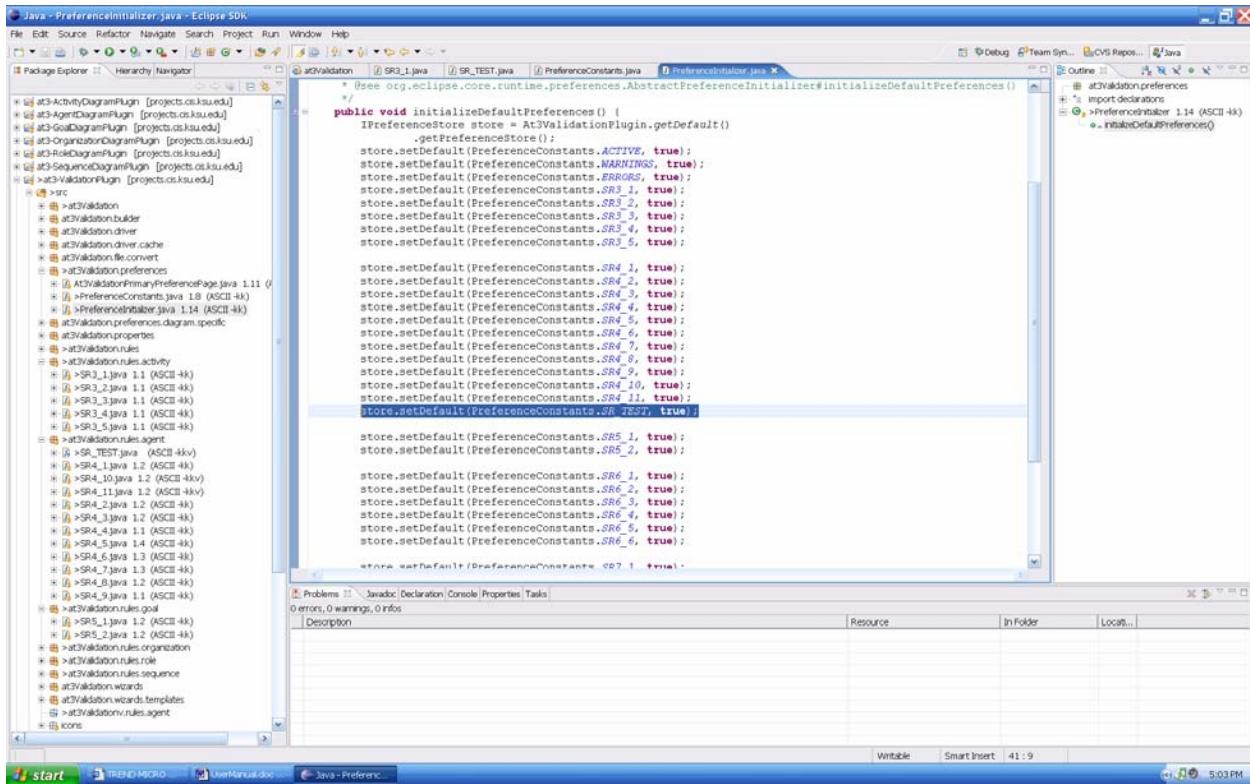
where VARIABLENAME is the name consistent to your rules name and name is the same value. Notice again that we replace any (.) with (_).



Next we need to provide a default value for this preference value. Open PreferenceInitializer.java located in the same package as before. Locate the appropriate place to place the initialization code and insert this line

```
store.setDefault(PreferenceConstants.<VARIABLENAME>,<VALUE>);
```

where VARIABLENAME is the same variable name given in PreferenceConstants.java. the value a Boolean value either true or false. Typically the user would want to insert true as the value.



We now need to add the rule to its corresponding preference page. To do this open the `at3Validation.preferences.diagram.specific` package and open the corresponding class file to your new rule. For example, if the rule's primary diagram was the Agent Diagram, you would open `at3Validation.preferences.diagram.specific.At3ValidationAgentDiagramRulesPreferencePage`.

```

Java - At3ValidationAgentDiagramRulesPreferencePage.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer Hierarchy Navigator
At3ValidationAgentDiagramRulesPreferencePage.java
package at3Validation.preferences.diagram_specific;
import org.eclipse.core.resources.IncrementalProjectBuilder;
...
public class At3ValidationAgentDiagramRulesPreferencePage
    extends FieldEditorPreferencePage
    implements IWorkbenchPreferencePage {
    ...
    private BooleanFieldEditor fourOne;
    private BooleanFieldEditor fourTwo;
    private BooleanFieldEditor fourThree;
    private BooleanFieldEditor fourFour;
    private BooleanFieldEditor fourFive;
    private BooleanFieldEditor fourSix;
    private BooleanFieldEditor fourSeven;
    private BooleanFieldEditor fourEight;
    private BooleanFieldEditor fourNine;
    private BooleanFieldEditor fourTen;
    private BooleanFieldEditor fourEleven;
    ...
    public At3ValidationAgentDiagramRulesPreferencePage() {
        super(GRID);
        setPreferenceStore(At3ValidationPlugin.getDefault().getPreferenceStore());
        setDescription("Select which Agent Diagram Rules are active when validating at3 Diagrams");
    }
    ...
    private void createFieldEditors() {
        ...
    }
}

```

First we need to create a private variable for our rule. Copy/paste one of the private variables to the bottom of the variable declarations. Change the pasted statements variable name to the name of your rule

```

Java - At3ValidationAgentDiagramRulesPreferencePage.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
At3Validation SP_NEW.java
At3ValidationAgentDiagramRulesPreferencePage.java
package at3Validation.preferences.diagram_specific;
import org.eclipse.core.resources.IncrementalProjectBuilder;
...
public class At3ValidationAgentDiagramRulesPreferencePage
    extends FieldEditorPreferencePage
    implements IWorkbenchPreferencePage {
    ...
    private BooleanFieldEditor fourOne;
    private BooleanFieldEditor fourTwo;
    private BooleanFieldEditor fourThree;
    private BooleanFieldEditor fourFour;
    private BooleanFieldEditor fourFive;
    private BooleanFieldEditor fourSix;
    private BooleanFieldEditor fourSeven;
    private BooleanFieldEditor fourEight;
    private BooleanFieldEditor fourNine;
    private BooleanFieldEditor fourTen;
    private BooleanFieldEditor fourEleven;
    private BooleanFieldEditor fourNew;
    ...
    DESCRIPTIONS
    private final static String fourOneDesc = "Agents that play a Role must be * ";
    ...
    private final static String fourNewDesc = "This is our new rule";
}

```

Next we need to create a description for our new rule. Create a new description variable. Just copy/paste a previous description variable to the end of our DESCRIPTIONS section.

```

private BooleanFieldEditor fourNine;
private BooleanFieldEditor fourTen;
private BooleanFieldEditor fourEleven;
private BooleanFieldEditor fourNew;

// DESCRIPTIONS
private final static String fourOneDesc = "Agents that play a Role must be " +
"capable of all performing all capabilities required by the Roles";
private final static String fourTwoDesc = "All Roles exist in a Role Diagram";
private final static String fourThreeDesc = "All Agents must have a protocol to " +
"at least Agent or Organization";
private final static String fourFourDesc = "All Agents must either have a capability " +
"or play a role";
private final static String fourFiveDesc = "No agents may be connected with a protocol " +
"relation unless the roles they connect to with the plays relation are themselves" +
" connected by a 'protocol' relation in a Role Diagram";
private final static String fourSixDesc = "Each organization must be connected to another" +
" organization or agent with a protocol relation";
private final static String fourSevenDesc = "Each service should be connected to at least" +
" one agent or organization with a provide relation";
private final static String fourEightDesc = "Each service should be named after one " +
"activity diagram present in the current directory";
private final static String fourNineDesc = "Each capability should be connected to at " +
"least one agent in the diagram with a possess relation";
private final static String fourTenDesc = "Each actor must be connected to some agent or" +
" organization with a 'protocol' relation";
private final static String fourElevenDesc = "Each actor should exist in at least one " +
"role diagram";
private final static String fourNewDesc = "This is our new rule";

public At3ValidationAgentDiagramRulesPreferencePage() {
    super();
    setPreferenceStore(AT3ValidationPlugin.getDefault().getPreferenceStore());
    setDescription("Select which Agent Diagram Rules are active when validating at3 Diagrams");
}

/**
 * Creates the field editors. Field editors are abstractions of
 * the common GUI blocks needed to manipulate various types
 * of preferences. Each field editor knows how to save and
 * restore itself.
 */
public void createFieldEditors() {
    fourOne = new BooleanFieldEditor(PreferenceConstants.SR4_1,
        fourOneDesc, getFieldEditorParent());
    fourTwo = new BooleanFieldEditor(PreferenceConstants.SR4_2,
        fourTwoDesc, getFieldEditorParent());
    fourThree = new BooleanFieldEditor(PreferenceConstants.SR4_3,
        fourThreeDesc, getFieldEditorParent());
    fourFour = new BooleanFieldEditor(PreferenceConstants.SR4_4,
        fourFourDesc, getFieldEditorParent());
    fourFive = new BooleanFieldEditor(PreferenceConstants.SR4_5,
        fourFiveDesc, getFieldEditorParent());
    fourSix = new BooleanFieldEditor(PreferenceConstants.SR4_6,
        fourSixDesc, getFieldEditorParent());
    fourSeven = new BooleanFieldEditor(PreferenceConstants.SR4_7,
        fourSevenDesc, getFieldEditorParent());
    fourEight = new BooleanFieldEditor(PreferenceConstants.SR4_8,
        fourEightDesc, getFieldEditorParent());
    fourNine = new BooleanFieldEditor(PreferenceConstants.SR4_9,
        fourNineDesc, getFieldEditorParent());
    fourTen = new BooleanFieldEditor(PreferenceConstants.SR4_10,
        fourTenDesc, getFieldEditorParent());
    fourEleven = new BooleanFieldEditor(PreferenceConstants.SR4_11,
        fourElevenDesc, getFieldEditorParent());
    fourNew = new BooleanFieldEditor(PreferenceConstants.SR_NEW,
        fourNewDesc, getFieldEditorParent());
    addField(fourOne);
    addField(fourTwo);
    addField(fourThree);
    addField(fourFour);
    addField(fourFive);
    addField(fourSix);
    addField(fourSeven);
    addField(fourEight);
    addField(fourNine);
    addField(fourTen);
    addField(fourEleven);
    addField(fourNew);
}

```

Now, go down to the CreateFieldEditors() method and copy and paste the first statement. Be sure to stay organized in doing so. Change the variable name to the one you place at the beginning of your code. Also change the PreferenceConstant and description variable appropriately. The Preference constant is the value you create in the PreferenceConstant class that distinguishes this rule.

```

public void createFieldEditors() {
    fourOne = new BooleanFieldEditor(PreferenceConstants.SR4_1,
        fourOneDesc, getFieldEditorParent());
    fourTwo = new BooleanFieldEditor(PreferenceConstants.SR4_2,
        fourTwoDesc, getFieldEditorParent());
    fourThree = new BooleanFieldEditor(PreferenceConstants.SR4_3,
        fourThreeDesc, getFieldEditorParent());
    fourFour = new BooleanFieldEditor(PreferenceConstants.SR4_4,
        fourFourDesc, getFieldEditorParent());
    fourFive = new BooleanFieldEditor(PreferenceConstants.SR4_5,
        fourFiveDesc, getFieldEditorParent());
    fourSix = new BooleanFieldEditor(PreferenceConstants.SR4_6,
        fourSixDesc, getFieldEditorParent());
    fourSeven = new BooleanFieldEditor(PreferenceConstants.SR4_7,
        fourSevenDesc, getFieldEditorParent());
    fourEight = new BooleanFieldEditor(PreferenceConstants.SR4_8,
        fourEightDesc, getFieldEditorParent());
    fourNine = new BooleanFieldEditor(PreferenceConstants.SR4_9,
        fourNineDesc, getFieldEditorParent());
    fourTen = new BooleanFieldEditor(PreferenceConstants.SR4_10,
        fourTenDesc, getFieldEditorParent());
    fourEleven = new BooleanFieldEditor(PreferenceConstants.SR4_11,
        fourElevenDesc, getFieldEditorParent());
    fourNew = new BooleanFieldEditor(PreferenceConstants.SR_NEW,
        fourNewDesc, getFieldEditorParent());
    addField(fourOne);
    addField(fourTwo);
    addField(fourThree);
    addField(fourFour);
    addField(fourFive);
    addField(fourSix);
    addField(fourSeven);
    addField(fourEight);
    addField(fourNine);
    addField(fourTen);
    addField(fourEleven);
    addField(fourNew);
}

```

Next copy and paste an addField(... statement, changing the parameter to the variable you just created.

```

public void createFieldDescriptors() {
    fourOne = new BooleanFieldEditor(PreferenceConstants.SR4_1,
        fourOneDesc, getFieldEditorParent());
    fourTwo = new BooleanFieldEditor(PreferenceConstants.SR4_2,
        fourTwoDesc, getFieldEditorParent());
    fourThree = new BooleanFieldEditor(PreferenceConstants.SR4_3,
        fourThreeDesc, getFieldEditorParent());
    fourFour = new BooleanFieldEditor(PreferenceConstants.SR4_4,
        fourFourDesc, getFieldEditorParent());
    fourFive = new BooleanFieldEditor(PreferenceConstants.SR4_5,
        fourFiveDesc, getFieldEditorParent());
    fourSix = new BooleanFieldEditor(PreferenceConstants.SR4_6,
        fourSixDesc, getFieldEditorParent());
    fourSeven = new BooleanFieldEditor(PreferenceConstants.SR4_7,
        fourSevenDesc, getFieldEditorParent());
    fourEight = new BooleanFieldEditor(PreferenceConstants.SR4_8,
        fourEightDesc, getFieldEditorParent());
    fourNine = new BooleanFieldEditor(PreferenceConstants.SR4_9,
        fourNineDesc, getFieldEditorParent());
    fourTen = new BooleanFieldEditor(PreferenceConstants.SR4_10,
        fourTenDesc, getFieldEditorParent());
    fourEleven = new BooleanFieldEditor(PreferenceConstants.SR4_11,
        fourElevenDesc, getFieldEditorParent());
    addField(fourOne);
    addField(fourTwo);
    addField(fourThree);
    addField(fourFour);
    addField(fourFive);
    addField(fourSix);
    addField(fourSeven);
    addField(fourEight);
    addField(fourNine);
    addField(fourTen);
    addField(fourEleven);
    addField(fourNew);
}

public boolean performOK() {
    setValue(fourOne, PreferenceConstants.SR4_1);
    setValue(fourTwo, PreferenceConstants.SR4_2);
    setValue(fourThree, PreferenceConstants.SR4_3);
    setValue(fourFour, PreferenceConstants.SR4_4);
    setValue(fourFive, PreferenceConstants.SR4_5);
    setValue(fourSix, PreferenceConstants.SR4_6);
    setValue(fourSeven, PreferenceConstants.SR4_7);
    setValue(fourEight, PreferenceConstants.SR4_8);
    setValue(fourNine, PreferenceConstants.SR4_9);
    setValue(fourTen, PreferenceConstants.SR4_10);
    setValue(fourEleven, PreferenceConstants.SR4_11);
    setValue(fourNew, PreferenceConstants.SR4_NEW);
}

```

Now go down to the performOK() method. Here you need to copy and paste one statement, changing the preferences accordingly and again, ensure organization.

```

public void createFieldDescriptors() {
    addField(fourOneDesc, getFieldEditorParent());
    addField(fourTwoDesc);
    addField(fourThreeDesc);
    addField(fourFourDesc);
    addField(fourFiveDesc);
    addField(fourSixDesc);
    addField(fourSevenDesc);
    addField(fourEightDesc);
    addField(fourNineDesc);
    addField(fourTenDesc);
    addField(fourElevenDesc);
    addField(fourNewDesc);
}

public boolean performOK() {
    setValue(fourOne, PreferenceConstants.SR4_1);
    setValue(fourTwo, PreferenceConstants.SR4_2);
    setValue(fourThree, PreferenceConstants.SR4_3);
    setValue(fourFour, PreferenceConstants.SR4_4);
    setValue(fourFive, PreferenceConstants.SR4_5);
    setValue(fourSix, PreferenceConstants.SR4_6);
    setValue(fourSeven, PreferenceConstants.SR4_7);
    setValue(fourEight, PreferenceConstants.SR4_8);
    setValue(fourNine, PreferenceConstants.SR4_9);
    setValue(fourTen, PreferenceConstants.SR4_10);
    setValue(fourEleven, PreferenceConstants.SR4_11);
    setValue(fourNew, PreferenceConstants.SR4_NEW);
    try {
        At3ValidationPlugin.getWorkspace().buildIncrementalProjectBuilder().CLEAN_BUILD, null);
    } catch (Exception e) {
        e.printStackTrace();
    }
    return super.performOK();
}

/* (non-Javadoc)
 * @see org.eclipse.ui.IWorkbenchPreferencePage#init(org.eclipse.ui.IWorkbench)
 */
public void init(IWorkbench workbench) {
}

private void setValue(BooleanFieldEditor bfe, String constant) {
    if (bfe.getBooleanValue() == true) {
        At3ValidationPlugin.getDefault().getPreferenceStore()
            .setValue(constant, true);
    } else {
}

```

Save your work and that's it. Now when we create at3 Diagrams, this rule is included during validation and is set to a value in the preference store.

Next we will discuss how to implement the run(IResource res) method in at3 Validation Rules.

3.4. Implementing the run() Method is Rules

To validate a rule with at3 Validation, our object class needs to extend ARule, which implements IRule. ARule provides us with some much needed functionality to aid in our quest while using the IRule interface enforces us to include the extra functions need to write our rules. The table below contains the functions available to us through ARule.

Function	Description
ARule()	A default constructor. Has no functionality.
setName(String)	Set the name of rule to the given name.
getName()	Returns the name of the rule
getActiveState(IProject)	Tells us if this rule is active.
setProblemState(String)	Sets the state to either warning or error
getProblemState(IProject)	Gives us whether rules problem state is active on the given project.
getProblemSetting()	Helper method to get the problem state setting
getProblemStateInt()	Gives us a value for our Problem state consistent with IMarker.SEVERITY
getPageId()	A unique identifier used to determine if the current project uses project specific settings.
UpdateMarkers(IResource, boolean, String, int)	Updates Problem markers on IResource. If Boolean is false, it deletes all markers on IResource without replacing them. String is the message sent back to the user while int is the type of Problem marker, either a warning or error.
okToMark(IResource)	Checks to make sure that according to the user's preferences, it is okay to place a marker.
DetermineDiagramType(String)	Uses the given String(a resources file extension) to determine which type of at3 Diagram a resource is.
RetriveFromCache(IResource, Integer)	Retrieves a resource of type Integer from our cache. If the resource is not present, it places the resource in to the cache.
GetOtherDiagram(IResource, Integer)	Gives us all the resources of type Integer present in the project that IResource is located in.
runAsSecondary(IResource, Integer)	Runs all rules associated with diagrams of type Integer that is located in the same project as IResource.

IRule forces us to implement the function run(IResource). This controls how to validate a rule on a diagram.

Now for the interesting function, run(IResource). Below is an example run(IResource) function. We will reference this throughout this section. IResource is the file that we are validating. To validate a diagram we first need to get the .xml file from our cache. To do this we use the function RetriveFromCache, inherited from ARule. This function will convert the .xml file into a usable at3 Diagram object. We pass our IResource to this function along with the type of diagram IResource is. We use the static types in DiagramType as the types. These are just unique identifiers used to distinguish the different at3 Diagram. We must be sure that the object type of object returned from RetriveFromCache is the same object type of the diagram we are validating. In our example we see that the object type is of AgentSchema. We must now check that we have actually retrieved a value from the cache. This is done by comparing our object to null. You must do this when implementing your rule.

Now that we have a valid at3 Diagram object, we search this to validate our diagram. In our example we are checking that in each Agent Diagram a protocol exist to at least one other agent or organization from each agent in agent diagram. We first get all the agents in the Agent Diagram and then check that a protocol relationship exists with the agent to either another agent or organization. After this we need to call UpdateMarkers. This will place

any Problem Markers on our file if the diagram is invalid. The UpdateMarkers() function takes three parameters, the resource the marker is place on, whether the rule was validated, and a description of the problem. If the rule is valid for the current component then all markers with the same description on the resource are removed. If the rule is invalid, a marker with the given description and type are placed on the resource. In this example we place a marker on the resource for every agent that is invalid within the Agent Diagram. Other examples are found in the at3Validation.rules package of the plug-in.

1	public void run(IResource res) {
2	boolean found;
3	AgentSchema agentDiagram = (AgentSchema)RetriveFromCache(res,
4	DiagramType.AgentDiagram);
5	if (agentDiagram != null) {
6	List allAgents = agentDiagram.getAgents();
7	for (int i = 0; i < allAgents.size(); ++i) {
8	found = true;
9	Agent a = (Agent)allAgents.get(i);
10	if (a.getProtocolSrcRelationships().isEmpty() &&
11	a.getProtocolDestRelationships().isEmpty()) {
12	found = false;
13	}
14	UpdateMarkers(res,
15	found,
16	a.getName() + " is not connected to at least one AGENT or " +
17	"ORGANIZATION by the PROTOCOL relationship.");
18	}
19	}

As a recap, there a few things all rules must do.

1. They must retrieve the diagram from the cache first and compare to null to ensure a diagram is given.
2. They must update markers, even if no problems are found. This is needed to remove any previous problems of the same type associated with the diagram.

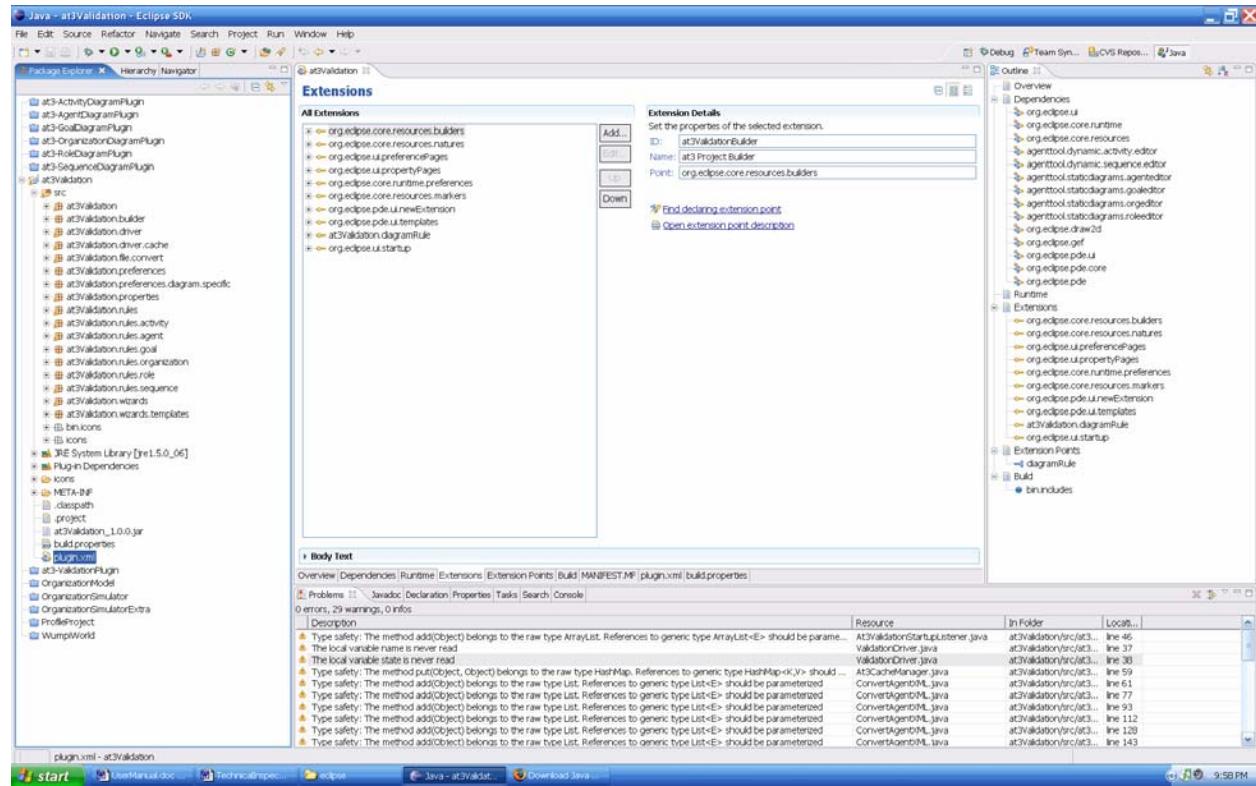
Please see the at3 Diagram Plug-ins' API's for a description of valid operation to retrieve components of each diagram object.

You should now be able to write your own at3 Validation rules and use them during validation of at3 Diagrams.

See appendix A for a tutorial to add an example rule.

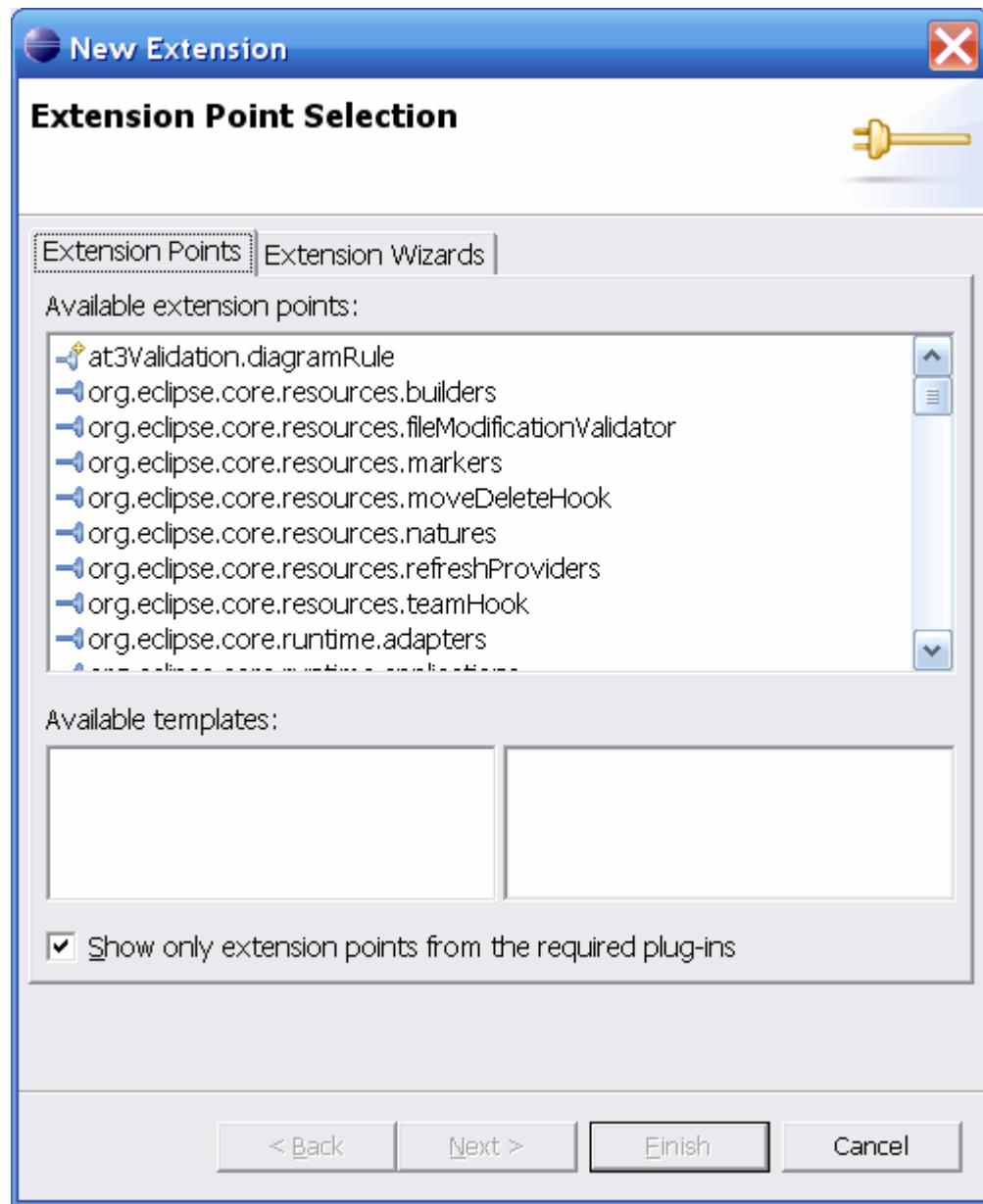
Appendix A

This is a tutorial that walks a user through creating a new rule called SR.NEW. Many snapshots in this tutorial are the same as the snapshots found earlier in this document.

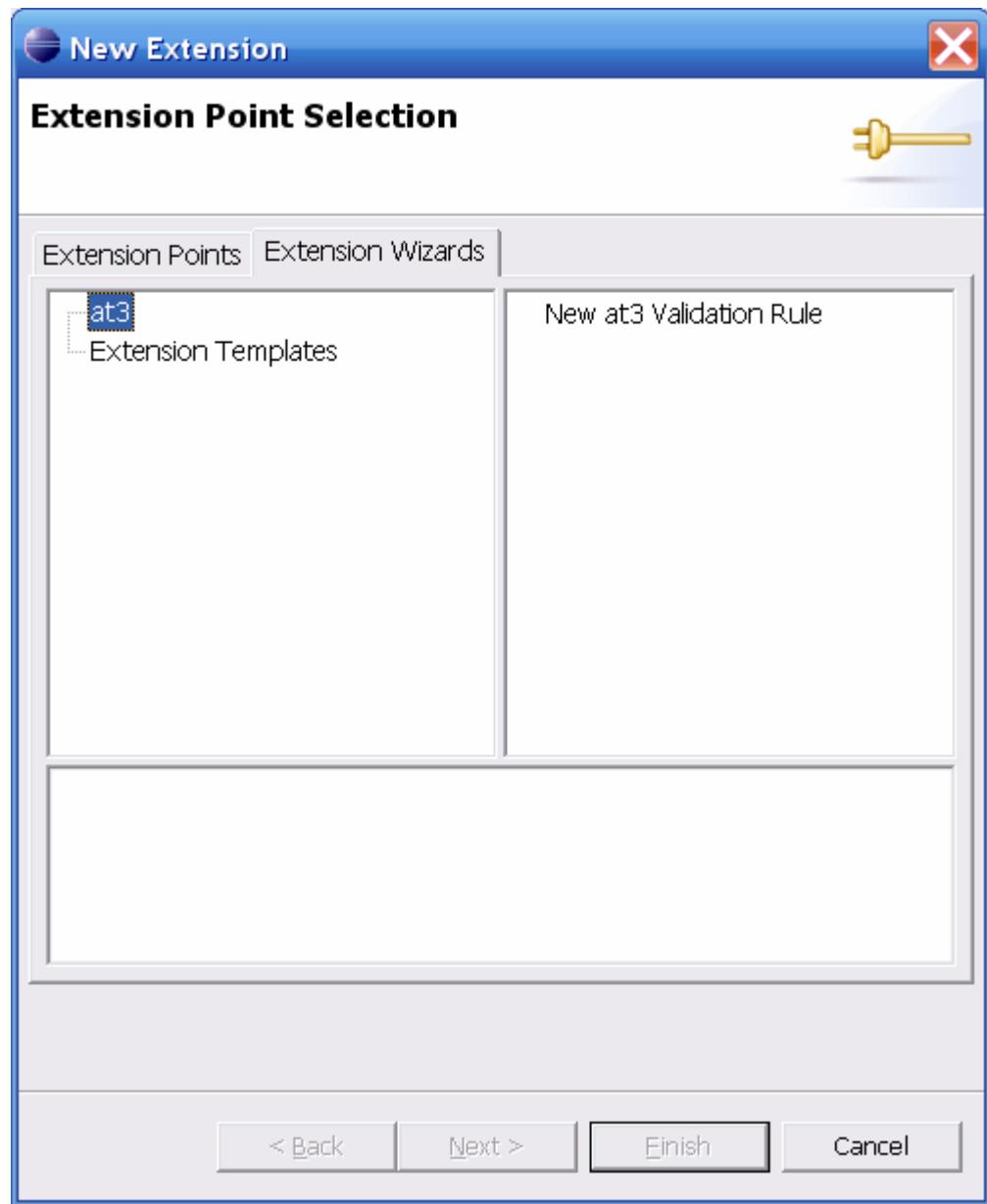


Select the Extension tab just below the editor page that just opened.

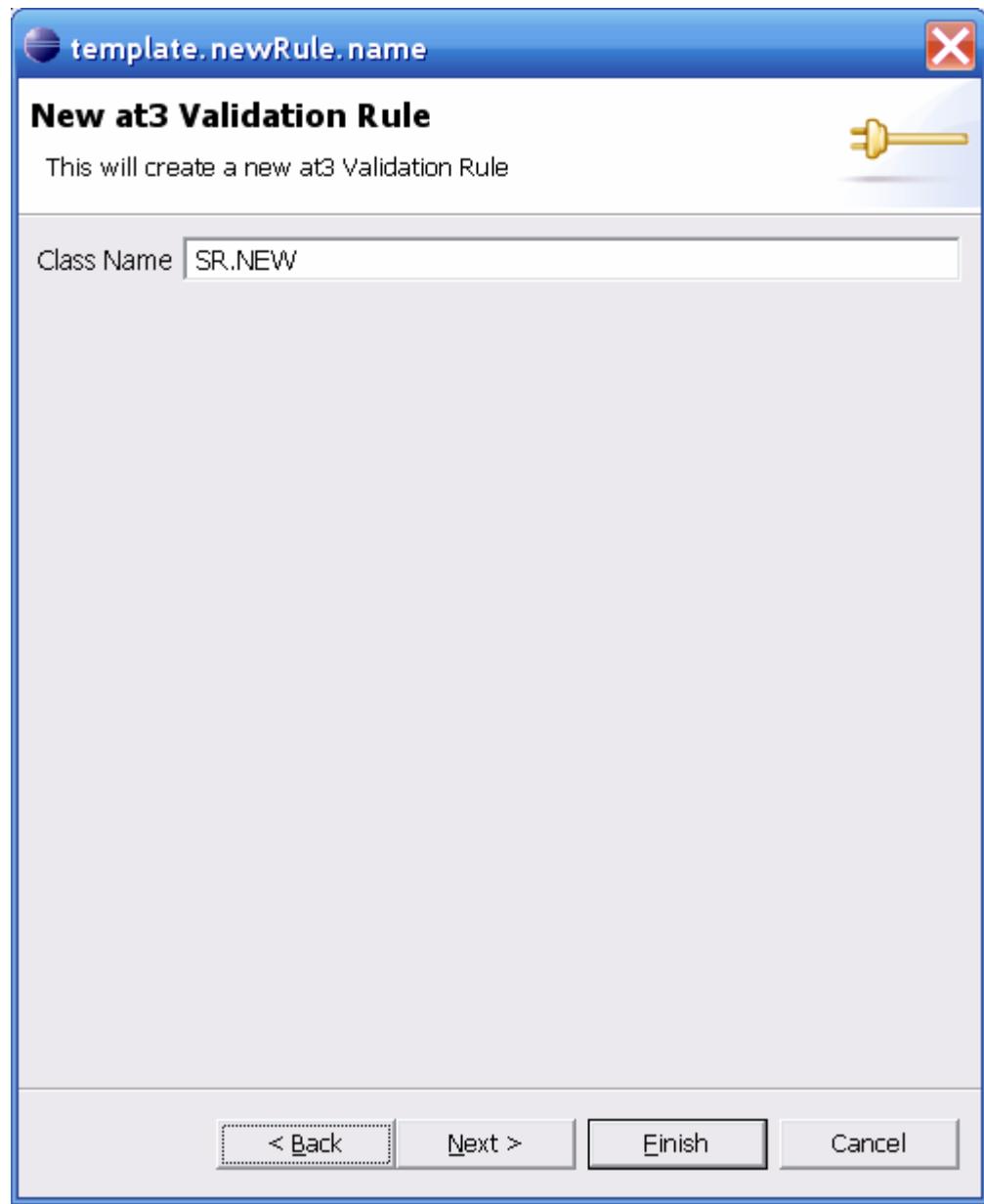
Also, select the **Add...** button next to the **All Extensions** box. This will bring up a list of all available extensions.



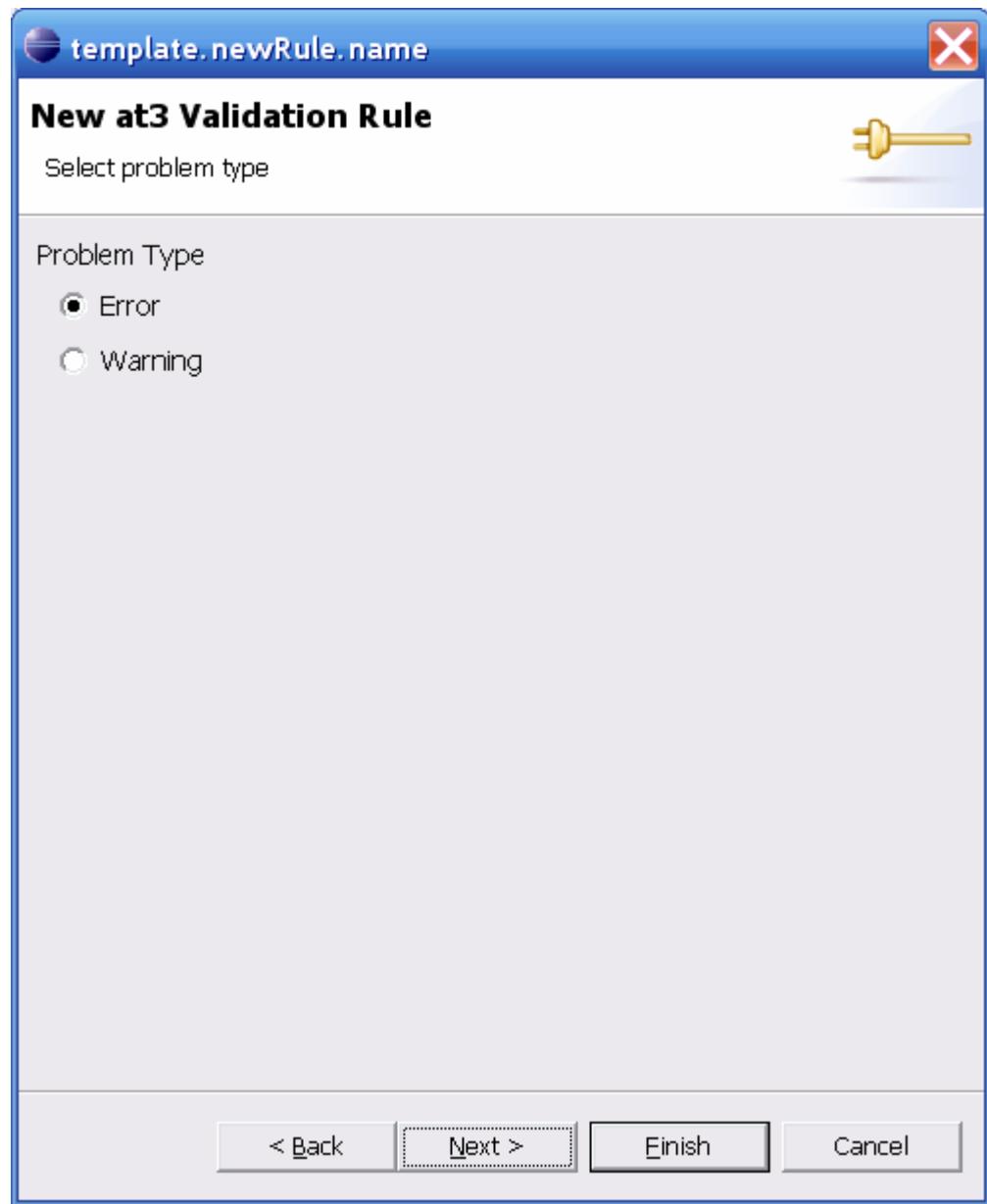
Select the Extension Wizards tab at the top of this page and then highlight at3, as shown.



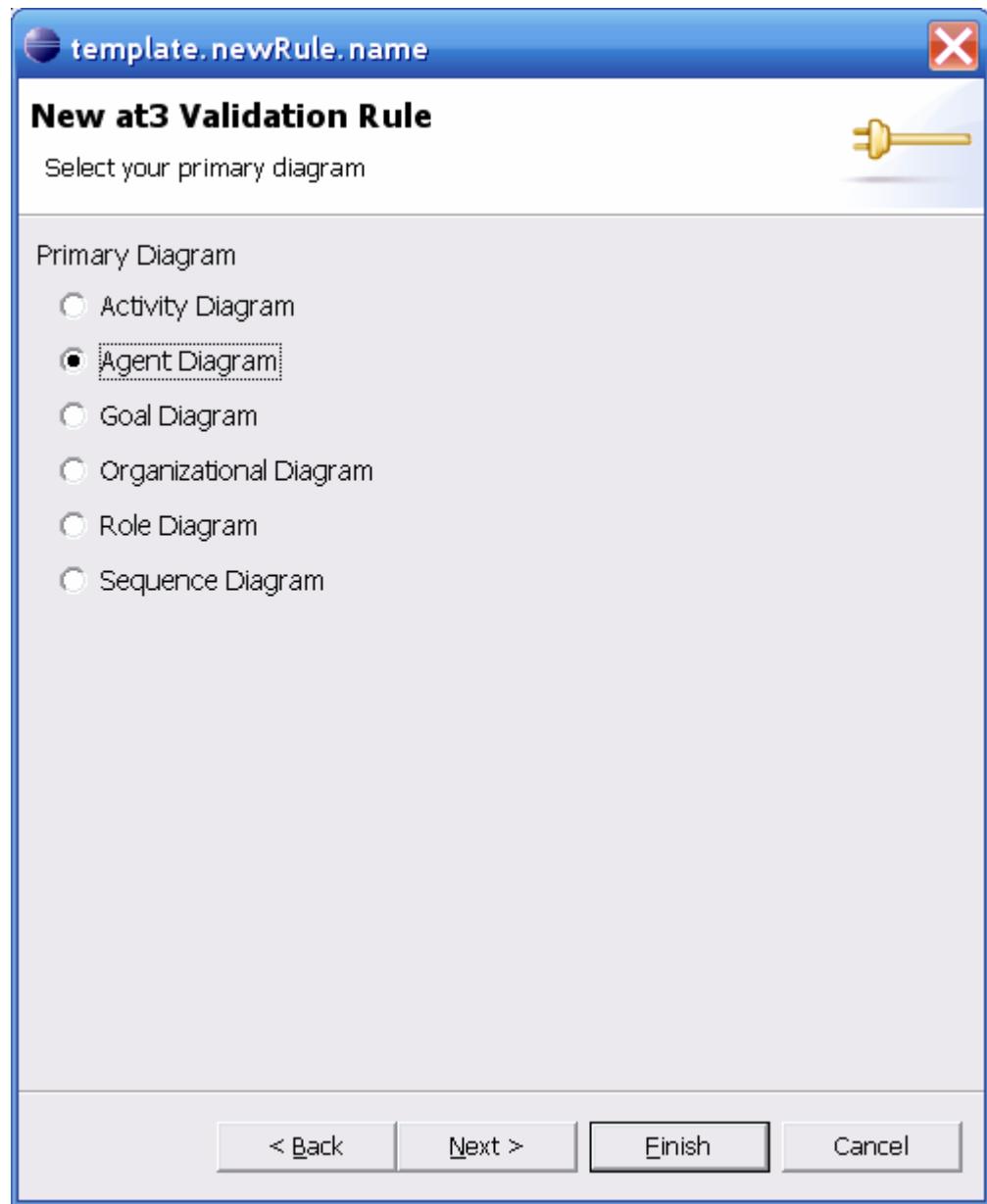
The “New at3 Validation Rule” is now visible in the right frame. Select this and press Finish. Insert the name of your new rule in the next page and select Next.



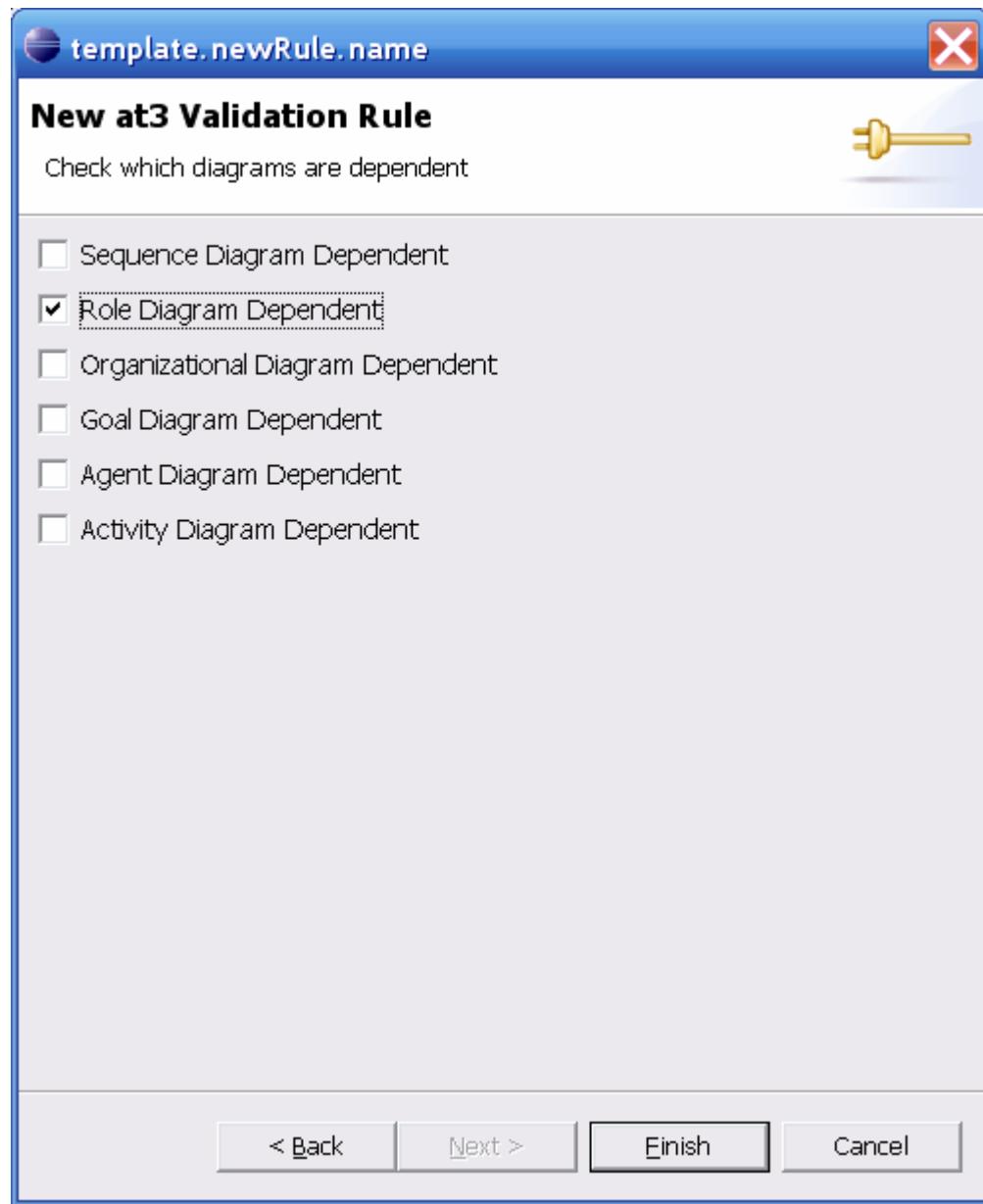
We can rename our rule if needed but we will just leave the default SR.NEW. On the next page select the Error radio button.



Select Next and select the primary diagram type as an Agent Diagram. This is the diagram that the rule is associated with.

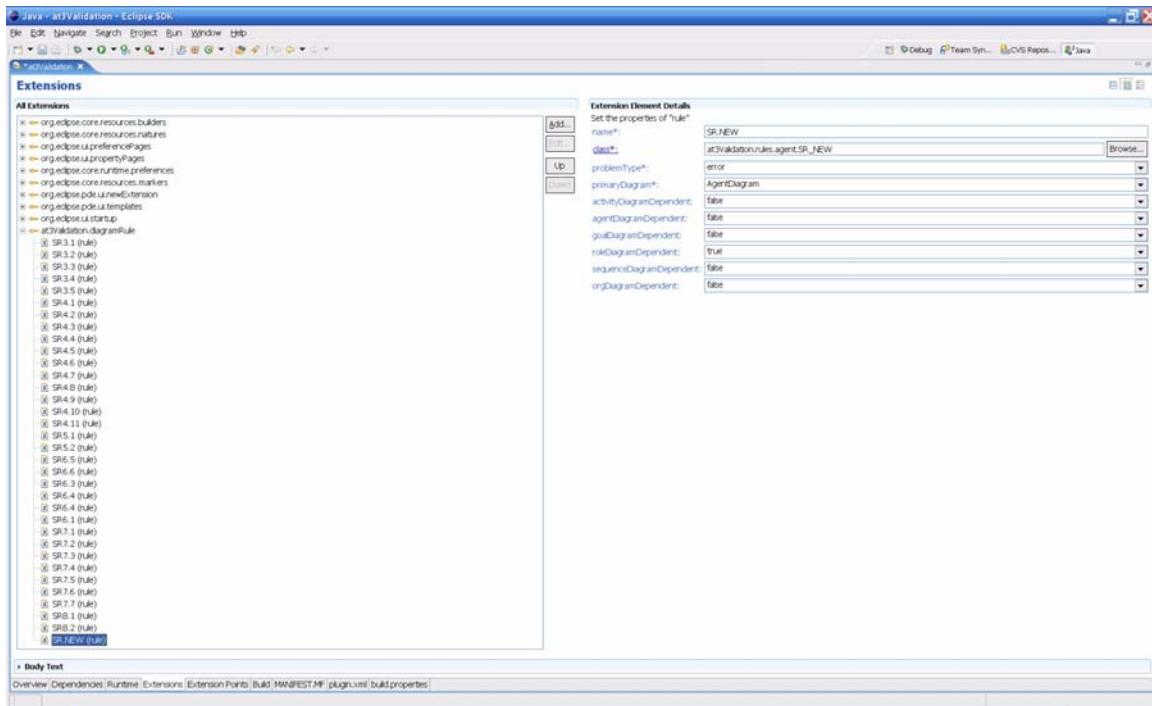


Select Next and check the boxes that correspond to the other diagram types this rule is associated with. For us this will be the Role Diagram only.



Select Finish.

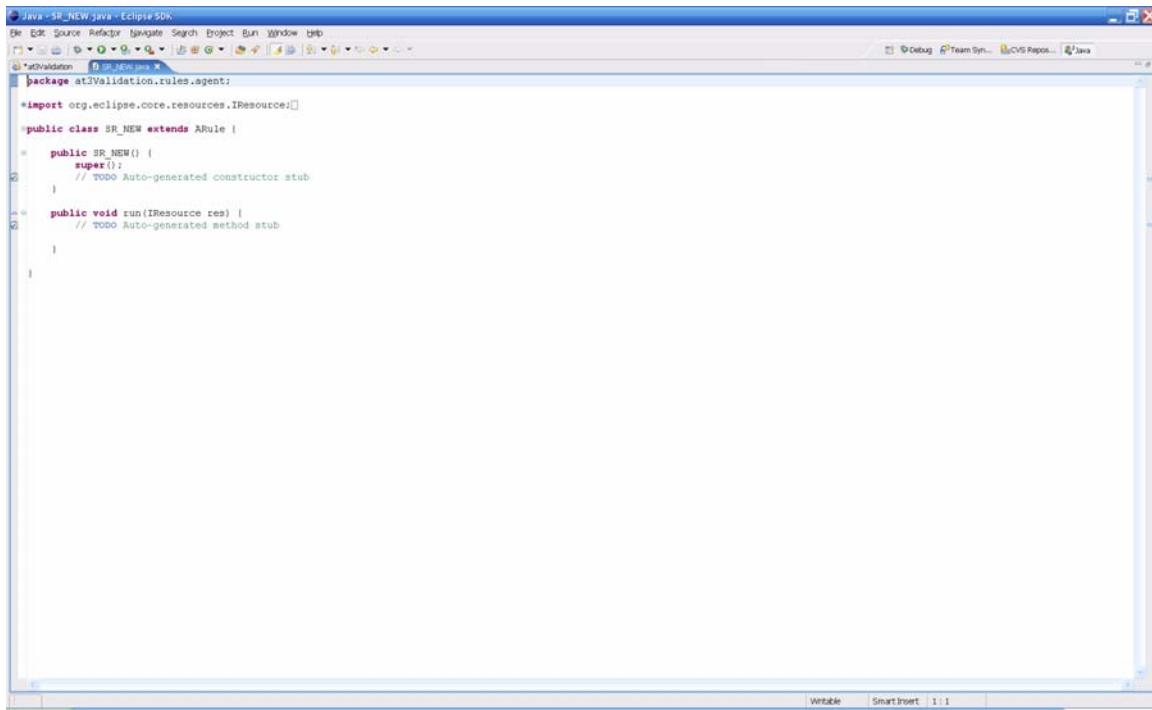
Once you click Finish, your new rule extension is placed under the `at3Validation.diagramRule` extensions in the `plugin.xml` page. The figure below shows this.



Verify that the properties on the right are correct. Notice that your new rule's class is pointing to a new class located in the rules folder. The location of the rule in rule's folder depends on your type of primary diagram. In this case it is located in the at3Validation.rules.agent package. This is the fully qualified location of the class that will implement your rule but in order to create the class you need to select the class*. link next to the location. Doing this brings up a new wizard that will create your class.



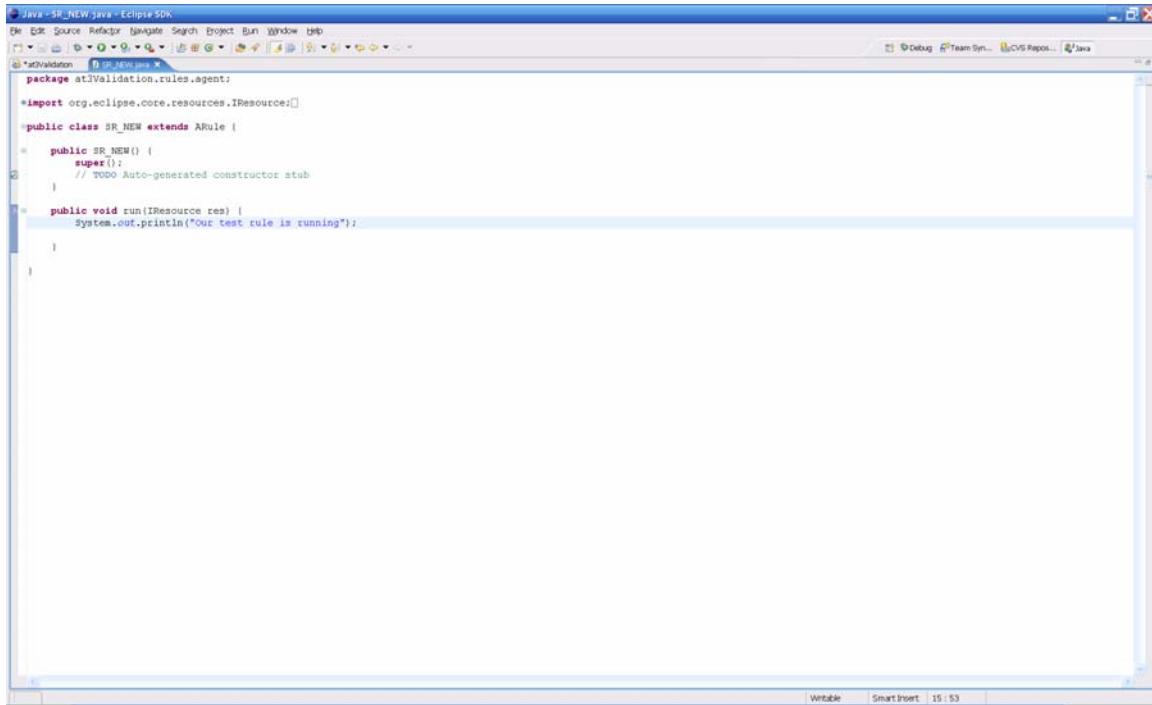
Notice that the Superclass is at3Validation.rules.ARule. This is need by all rules for validation. Everything should be correct so select Finish. Your new class will be opened for editing in Eclipse.



```
java - SR_NEW.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
at3Validation SR_NEW.java
package at3Validation.rules.agent;
import org.eclipse.core.resources.IResource;
public class SR_NEW extends ARule {
    public SR_NEW() {
        super();
        // TODO Auto-generated constructor stub
    }
    public void run(IResource res) {
        // TODO Auto-generated method stub
    }
}
```

Right now the only method we are concerned with is the run(IResource) function. Place the line of code below into this function.

```
System.out.println("Our test rule is running.");
```



```
java - SR_NEW.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
at3Validation SR_NEW.java
package at3Validation.rules.agent;
import org.eclipse.core.resources.IResource;
public class SR_NEW extends ARule {
    public SR_NEW() {
        super();
        // TODO Auto-generated constructor stub
    }
    public void run(IResource res) {
        System.out.println("Our test rule is running.");
    }
}
```

Save all of your work. Now we need to set the preference values.

Setting Preference Store Values

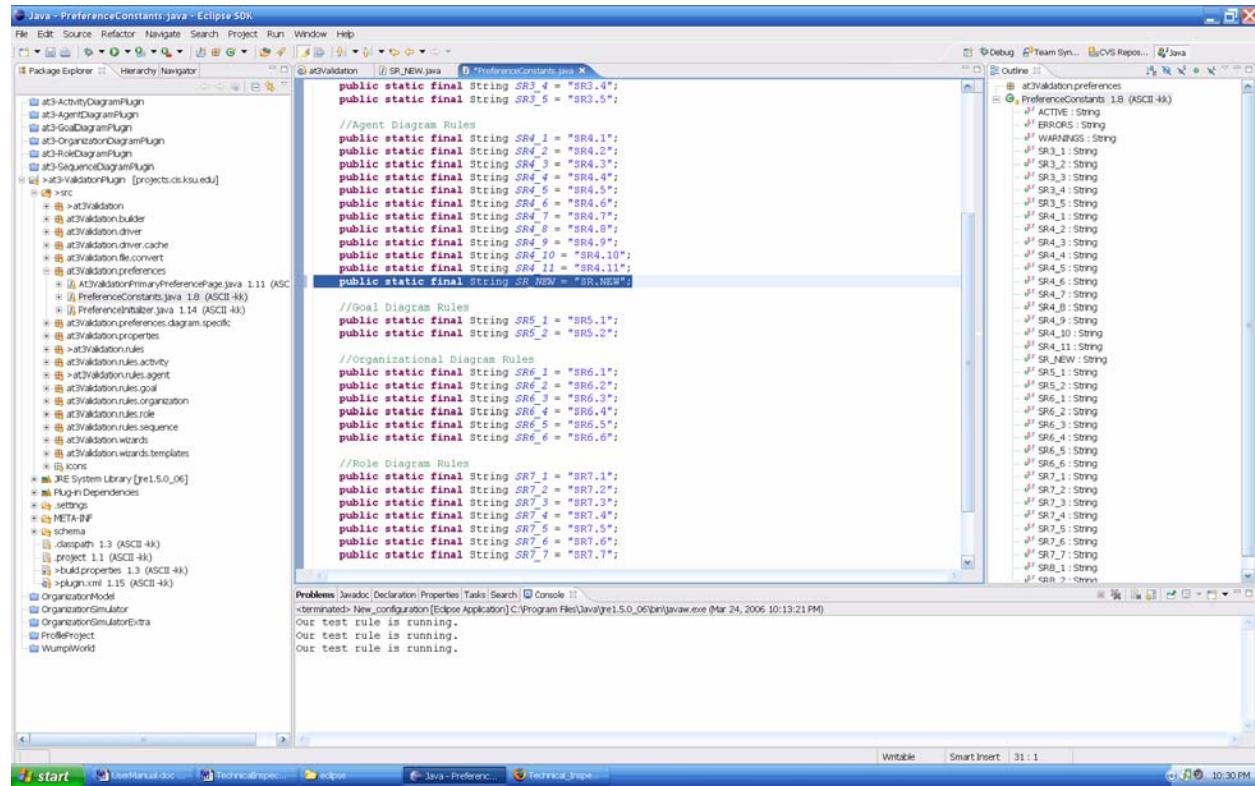
Once the basic structure of the rule is completed using either Method 1 or Method 2, the user must create and set the values within the preference store. To do this open the class PreferenceConstants.java located in at3Validation.preferences. This is where we create a value for our new rule in Eclipse's Preference Store. Using the name given to you new rule (in our case SR_NEW), find the primary diagrams section in the class and add the line

```
public static final String <VARIABLENAME> = "name";
```

where VARIABLENAME is the name consistent to your rules name and name is the same value. Notice again that we replace any (.) with (_).

For us the line of code is

```
Public static final String SR_NEW = "SR.NEW";
```



Next we need to provide a default value for this preference value. Open PreferenceInitializer.java located in the same package as before. Locate the appropriate place to place the initialization code and insert this line

```
store.setDefault(PreferenceConstants.<VARIABLENAME>,<VALUE>);
```

where VARIABLENAME is the same variable name given in PreferenceConstants.java. the value a Boolean value either true or false. Typically the user would want to insert true as the value.

Again, for the inspection, the line of code is:

```
store.setDefault(PreferenceConstants.SR_NEW, true);
```

```

Java - PreferenceInitializer.java - Eclipse 5.0
File Edit Source Refactor Navigate Project Run Window Help
Package Explorer Hierarchy Navigator at3Validation SR_NEW.java PreferenceInitializer.java
public void initializeDefaultPreferences() {
    IPreferenceStore store = At3ValidationPlugin.getDefault().getPreferenceStore();
    store.setDefault(IPreferenceStore.SR_NEW, true);
    store.setDefault(IPreferenceStoreConstants.SR4_1, true);
    store.setDefault(IPreferenceStoreConstants.SR4_2, true);
    store.setDefault(IPreferenceStoreConstants.SR4_3, true);
    store.setDefault(IPreferenceStoreConstants.SR4_4, true);
    store.setDefault(IPreferenceStoreConstants.SR4_5, true);
    store.setDefault(IPreferenceStoreConstants.SR4_6, true);
    store.setDefault(IPreferenceStoreConstants.SR4_7, true);
    store.setDefault(IPreferenceStoreConstants.SR4_8, true);
    store.setDefault(IPreferenceStoreConstants.SR4_9, true);
    store.setDefault(IPreferenceStoreConstants.SR4_10, true);
    store.setDefault(IPreferenceStoreConstants.SR4_11, true);
    store.setDefault(IPreferenceStoreConstants.SR4_12, true);
    store.setDefault(IPreferenceStoreConstants.SR5_1, true);
    store.setDefault(IPreferenceStoreConstants.SR5_2, true);
    store.setDefault(IPreferenceStoreConstants.SR6_1, true);
    store.setDefault(IPreferenceStoreConstants.SR6_2, true);
    store.setDefault(IPreferenceStoreConstants.SR6_3, true);
    store.setDefault(IPreferenceStoreConstants.SR6_4, true);
    store.setDefault(IPreferenceStoreConstants.SR6_5, true);
}

```

We now need to add the rule to its corresponding preference page. To do this open the `at3Validation.preferences.diagram.specific` package and open the corresponding class file to your new rule. For example, if the rule's primary diagram was the Agent Diagram, you would open `at3Validation.preferences.diagram.specific.At3ValidationAgentDiagramRulesPreferencePage`.

First we need to create a private variable for our rule. Copy/paste one of the private variables to the bottom of the variable declarations. Change the pasted statements variable name to the name of your rule

```

package at3Validation.preferences.diagram.specific;

import org.eclipse.core.resources.IncrementalProjectBuilder;

/**
 * Preference Page to control the at3 Validation Rule's setting
 */
public class At3ValidationAgentDiagramRulesPreferencePage
    extends FieldEditorPreferencePage
    implements IWorkbenchPreferencePage {

    private BooleanFieldEditor fourOne;
    private BooleanFieldEditor fourTwo;
    private BooleanFieldEditor fourThree;
    private BooleanFieldEditor fourFour;
    private BooleanFieldEditor fourFive;
    private BooleanFieldEditor fourSix;
    private BooleanFieldEditor fourSeven;
    private BooleanFieldEditor fourEight;
    private BooleanFieldEditor fourNine;
    private BooleanFieldEditor fourTen;
    private BooleanFieldEditor fourEleven;
    private BooleanFieldEditor fourNew;

    /**
     * DESCRIPTIONS
     */
    private final static String fourOneDesc = "Agents that play a Role must be " +
        "capable of all performing all capabilities required by the Roles";
    private final static String fourTwoDesc = "All Roles exist in a Role Diagram";
    private final static String fourThreeDesc = "All Agents must have a protocol to " +
        "at least Agent or Organization";
    private final static String fourFourDesc = "All Agents must either have a capability" +
        " or play a role";
    private final static String fourFiveDesc = "No agents may be connected with a protocol " +
        "relation unless the roles they connect to with the plays relation are themselves" +
        " connected by a "protocol" relation in a Role Diagram";
    private final static String fourSixDesc = "Each organization must be connected to another" +
        " organization or agent with a protocol relation";
    private final static String fourSevenDesc = "Each service should be connected to at least" +
        " one agent or organization with a provides relation";
    private final static String fourEightDesc = "Each service should be named after one " +
        "activity diagram present in the current directory";
    private final static String fourNineDesc = "Each capability should be connected to at " +
        "least one agent in the diagram with a possess relation";
    private final static String fourTenDesc = "Each actor must be connected to some agent or" +
        " organization with a "protocol" relation";
    private final static String fourElevenDesc = "Each actor should exist in at least one " +
        "role diagram";
    private final static String fourNewDesc = "This is our new rule";
}

```

Next we need to create a description for our new rule. Create a new description variable. Just copy/paste a previous description variable to the end of our DESCRIPTIONS section.

```

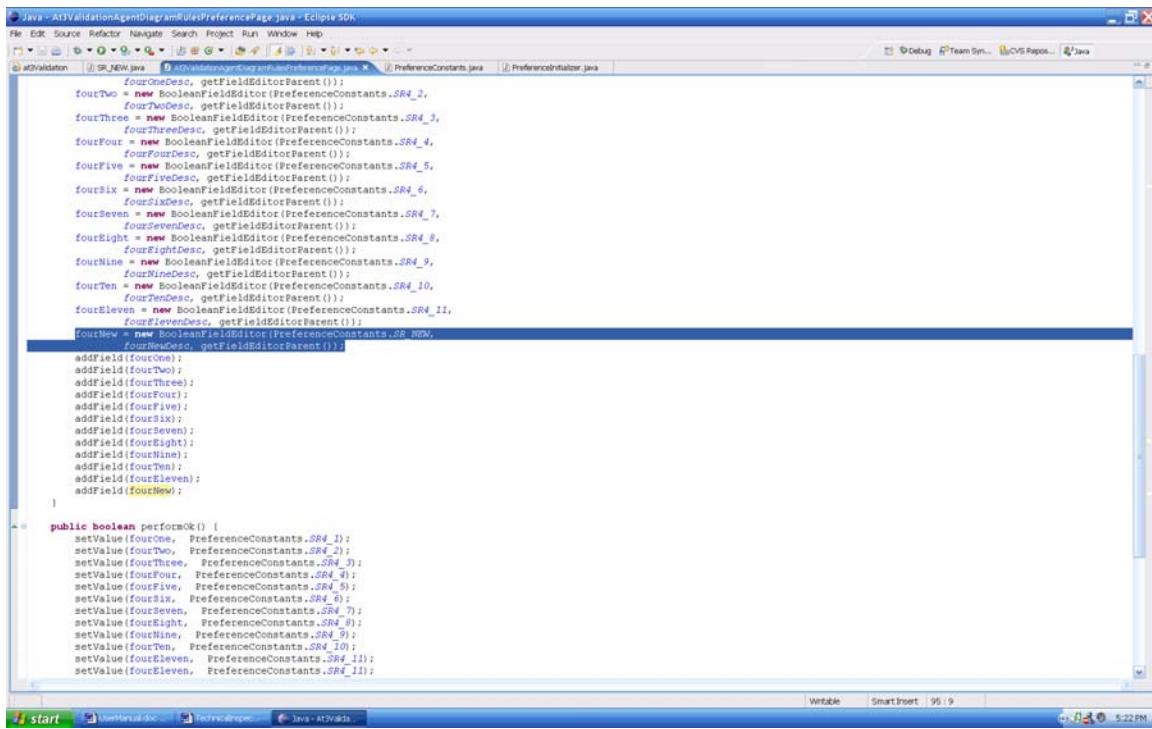
private final static String fourOneDesc = "Agents that play a Role must be " +
    "capable of all performing all capabilities required by the Roles";
private final static String fourTwoDesc = "All Roles exist in a Role Diagram";
private final static String fourThreeDesc = "All Agents must have a protocol to " +
    "at least Agent or Organization";
private final static String fourFourDesc = "All Agents must either have a capability" +
    " or play a role";
private final static String fourFiveDesc = "No agents may be connected with a protocol " +
    "relation unless the roles they connect to with the plays relation are themselves" +
    " connected by a "protocol" relation in a Role Diagram";
private final static String fourSixDesc = "Each organization must be connected to another" +
    " organization or agent with a protocol relation";
private final static String fourSevenDesc = "Each service should be connected to at least" +
    " one agent or organization with a provides relation";
private final static String fourEightDesc = "Each service should be named after one " +
    "activity diagram present in the current directory";
private final static String fourNineDesc = "Each capability should be connected to at " +
    "least one agent in the diagram with a possess relation";
private final static String fourTenDesc = "Each actor must be connected to some agent or" +
    " organization with a "protocol" relation";
private final static String fourElevenDesc = "Each actor should exist in at least one " +
    "role diagram";
private final static String fourNewDesc = "This is our new rule";

public At3ValidationAgentDiagramRulesPreferencePage() {
    super(GRID);
    setPreferenceStore(At3ValidationPlugin.getDefault().getPreferenceStore());
    setDescription("Select which Agent Diagram Rules are active when validating at3 Diagrams");
}

/**
 * Creates the field editors. Field editors are abstractions of
 * the common GUI blocks needed to manipulate various types
 * of preferences. Each field editor knows how to save and
 * restore itself.
 */
public void createFieldEditors() {
    fourOne = new BooleanFieldEditor(PreferenceConstants.SR4_1,
        fourOneDesc, getFieldEditorParent());
    fourTwo = new BooleanFieldEditor(PreferenceConstants.SR4_2,
        fourTwoDesc, getFieldEditorParent());
    fourThree = new BooleanFieldEditor(PreferenceConstants.SR4_3,
        fourThreeDesc, getFieldEditorParent());
}

```

Now, go down to the CreateFieldEditors() method and copy and paste the first statement. Be sure to stay organized in doing so. Change the variable name to the one you place at the beginning of your code. Also change the PreferenceConstant and description variable appropriately. The Preference constant is the value you create in the PreferenceConstant class that distinguishes this rule.



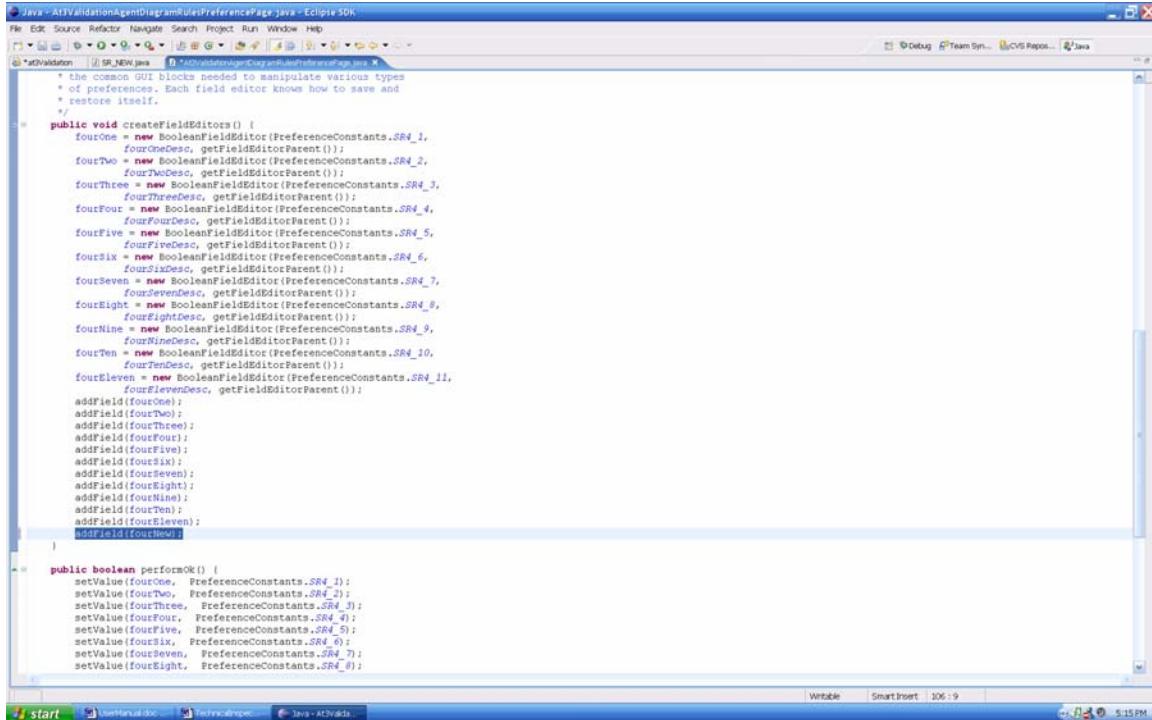
```

public AValidationAgentDiagramRulesPreferencePage() {
    fourOneDesc = new BooleanFieldEditor(PreferenceConstants.SR4_1,
        fourOneDesc, getFieldEditorParent());
    fourTwoDesc = new BooleanFieldEditor(PreferenceConstants.SR4_2,
        fourTwoDesc, getFieldEditorParent());
    fourThree = new BooleanFieldEditor(PreferenceConstants.SR4_3,
        fourThreeDesc, getFieldEditorParent());
    fourFour = new BooleanFieldEditor(PreferenceConstants.SR4_4,
        fourFourDesc, getFieldEditorParent());
    fourFive = new BooleanFieldEditor(PreferenceConstants.SR4_5,
        fourFiveDesc, getFieldEditorParent());
    fourSix = new BooleanFieldEditor(PreferenceConstants.SR4_6,
        fourSixDesc, getFieldEditorParent());
    fourSeven = new BooleanFieldEditor(PreferenceConstants.SR4_7,
        fourSevenDesc, getFieldEditorParent());
    fourEight = new BooleanFieldEditor(PreferenceConstants.SR4_8,
        fourEightDesc, getFieldEditorParent());
    fourNine = new BooleanFieldEditor(PreferenceConstants.SR4_9,
        fourNineDesc, getFieldEditorParent());
    fourTenDesc = new BooleanFieldEditor(PreferenceConstants.SR4_10,
        fourTenDesc, getFieldEditorParent());
    fourEleven = new BooleanFieldEditor(PreferenceConstants.SR4_11,
        fourElevenDesc, getFieldEditorParent());
    fourNewDesc = new BooleanFieldEditor(PreferenceConstants.SR4_NEW,
        fourNewDesc, getFieldEditorParent());
}

public void performOK() {
    setValue(fourOne, PreferenceConstants.SR4_1);
    setValue(fourTwo, PreferenceConstants.SR4_2);
    setValue(fourThree, PreferenceConstants.SR4_3);
    setValue(fourFour, PreferenceConstants.SR4_4);
    setValue(fourFive, PreferenceConstants.SR4_5);
    setValue(fourSix, PreferenceConstants.SR4_6);
    setValue(fourSeven, PreferenceConstants.SR4_7);
    setValue(fourEight, PreferenceConstants.SR4_8);
    setValue(fourNine, PreferenceConstants.SR4_9);
    setValue(fourTen, PreferenceConstants.SR4_10);
    setValue(fourEleven, PreferenceConstants.SR4_11);
    setValue(fourEleven, PreferenceConstants.SR4_11);
}

```

Next copy and paste an `addField(...)` statement, changing the parameter to the variable you just created.



```

public void createFieldEditors() {
    fourOne = new BooleanFieldEditor(PreferenceConstants.SR4_1,
        fourOneDesc, getFieldEditorParent());
    fourTwo = new BooleanFieldEditor(PreferenceConstants.SR4_2,
        fourTwoDesc, getFieldEditorParent());
    fourThree = new BooleanFieldEditor(PreferenceConstants.SR4_3,
        fourThreeDesc, getFieldEditorParent());
    fourFour = new BooleanFieldEditor(PreferenceConstants.SR4_4,
        fourFourDesc, getFieldEditorParent());
    fourFive = new BooleanFieldEditor(PreferenceConstants.SR4_5,
        fourFiveDesc, getFieldEditorParent());
    fourSix = new BooleanFieldEditor(PreferenceConstants.SR4_6,
        fourSixDesc, getFieldEditorParent());
    fourSeven = new BooleanFieldEditor(PreferenceConstants.SR4_7,
        fourSevenDesc, getFieldEditorParent());
    fourEight = new BooleanFieldEditor(PreferenceConstants.SR4_8,
        fourEightDesc, getFieldEditorParent());
    fourNine = new BooleanFieldEditor(PreferenceConstants.SR4_9,
        fourNineDesc, getFieldEditorParent());
    fourTen = new BooleanFieldEditor(PreferenceConstants.SR4_10,
        fourTenDesc, getFieldEditorParent());
    fourEleven = new BooleanFieldEditor(PreferenceConstants.SR4_11,
        fourElevenDesc, getFieldEditorParent());
    addField(fourOne);
    addField(fourTwo);
    addField(fourThree);
    addField(fourFour);
    addField(fourFive);
    addField(fourSeven);
    addField(fourEight);
    addField(fourNine);
    addField(fourTen);
    addField(fourEleven);
    addField(fourNew);
}

public boolean performOK() {
    setValue(fourOne, PreferenceConstants.SR4_1);
    setValue(fourTwo, PreferenceConstants.SR4_2);
    setValue(fourThree, PreferenceConstants.SR4_3);
    setValue(fourFour, PreferenceConstants.SR4_4);
    setValue(fourFive, PreferenceConstants.SR4_5);
    setValue(fourSix, PreferenceConstants.SR4_6);
    setValue(fourSeven, PreferenceConstants.SR4_7);
    setValue(fourEight, PreferenceConstants.SR4_8);
    setValue(fourNine, PreferenceConstants.SR4_9);
}

```

Now go down to the `performOK()` method. Here you need to copy and paste one statement, changing the preferences accordingly and again, ensure organization.

```
Java - AtValidationAgentDiagramRulesPreferencePage.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
atValidation AtValidationAgentDiagramRulesPreferencePage.java PreferenceConstants.java PreferenceInitializer.java Debug Team Sync CVS Repos Java
public void createControls(Composite parent) {
    fourNewDesc_ = new Text(parent, SWT.BORDER);
    addField(fourOne);
    addField(fourTwo);
    addField(fourThree);
    addField(fourFour);
    addField(fourFive);
    addField(fourSix);
    addField(fourSeven);
    addField(fourEight);
    addField(fourNine);
    addField(fourTen);
    addField(fourEleven);
    addField(fourNew);
}

public boolean performOK() {
    setValue(fourOne, PreferenceConstants.SR4_1);
    setValue(fourTwo, PreferenceConstants.SR4_2);
    setValue(fourThree, PreferenceConstants.SR4_3);
    setValue(fourFour, PreferenceConstants.SR4_4);
    setValue(fourFive, PreferenceConstants.SR4_5);
    setValue(fourSix, PreferenceConstants.SR4_6);
    setValue(fourSeven, PreferenceConstants.SR4_7);
    setValue(fourEight, PreferenceConstants.SR4_8);
    setValue(fourNine, PreferenceConstants.SR4_9);
    setValue(fourTen, PreferenceConstants.SR4_10);
    setValue(fourEleven, PreferenceConstants.SR4_11);
    setValue(fourNew, PreferenceConstants.SR4_12);
    try {
        AtValidationPlugin.getWorkspace().build(IncrementalProjectBuilder.CLEAN_BUILD, null);
    }
    catch(Exception e) {
        e.printStackTrace();
    }
    return super.performOK();
}

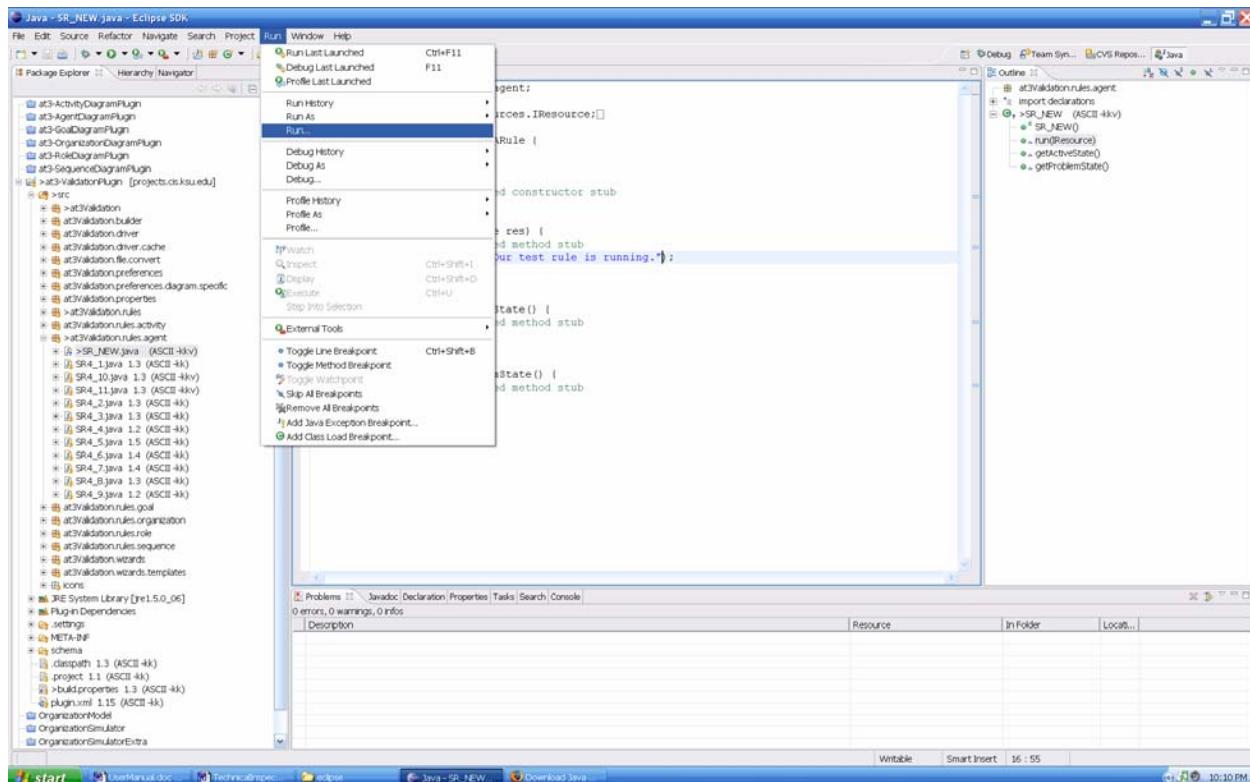
/*
 * (non-Javadoc)
 * @see org.eclipse.ui.IWorkbenchPreferencePage#init(org.eclipse.ui.IWorkbench)
 */
public void init(IWorkbench workbench) {
}

private void setValue(BooleanFieldEditor bfe, String constant) {
    if (bfe.getBooleanValue() == true) {
        AtValidationPlugin.getDefault().getPreferenceStore()
            .setValue(constant, true);
    }
    else {
}
}

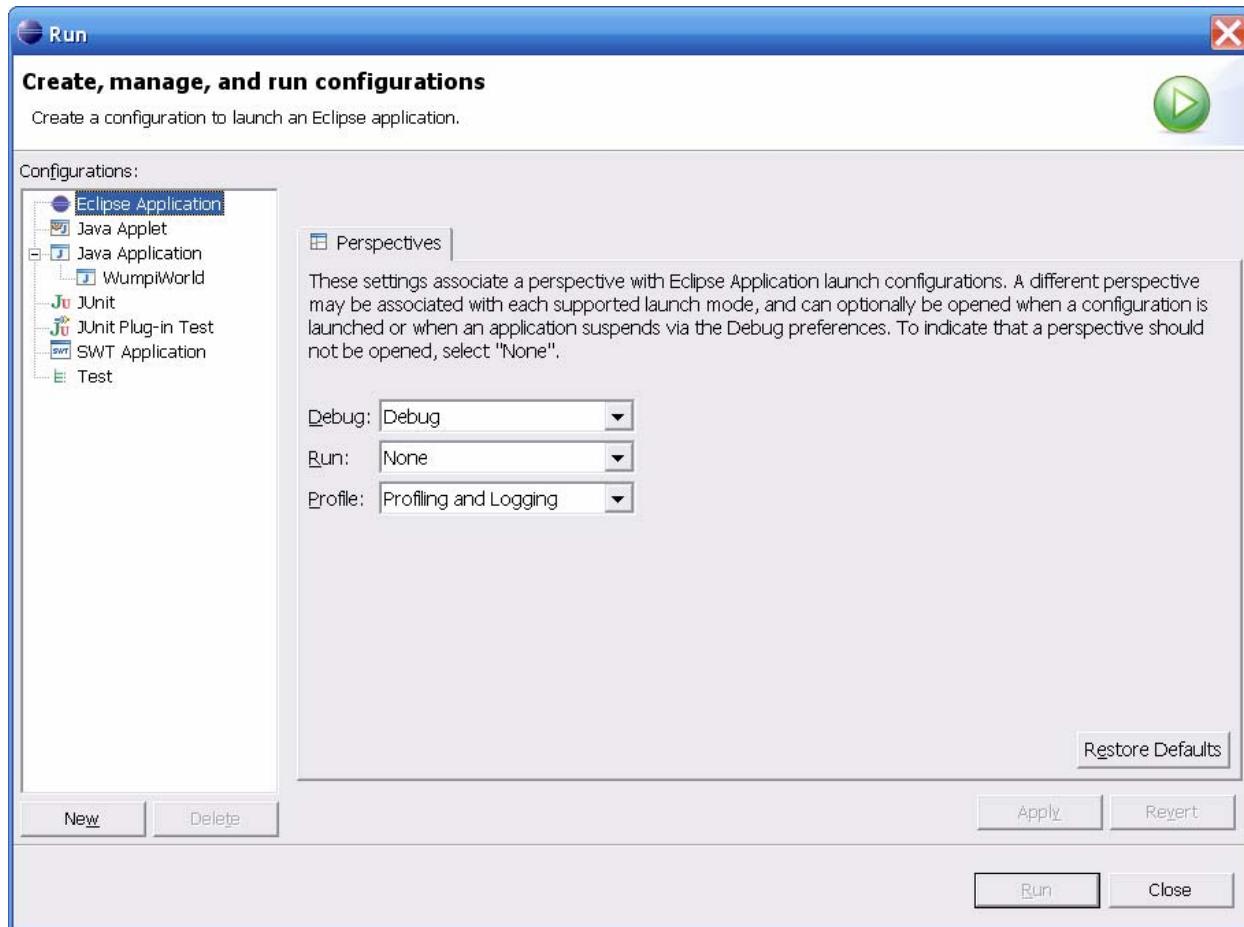
```

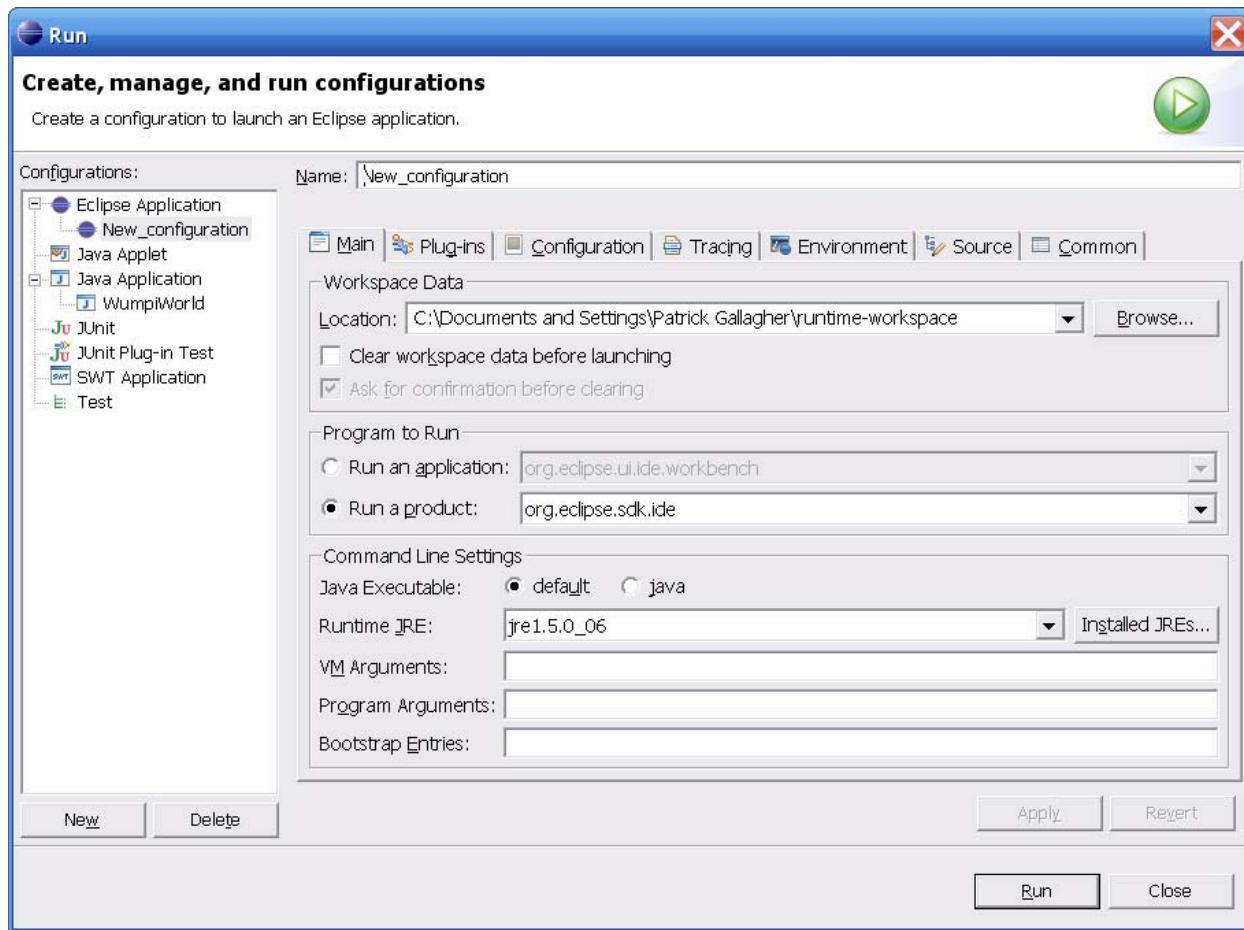
That's it. Now when we create at3 Diagrams, this rule is included during validation.

We will now run the plug-in in a runtime workbench to verify that our new rule is running. Select Run on the menu bar and then select Run...



Now highlight Eclipse Application and select New. This will create a new configuration for us.

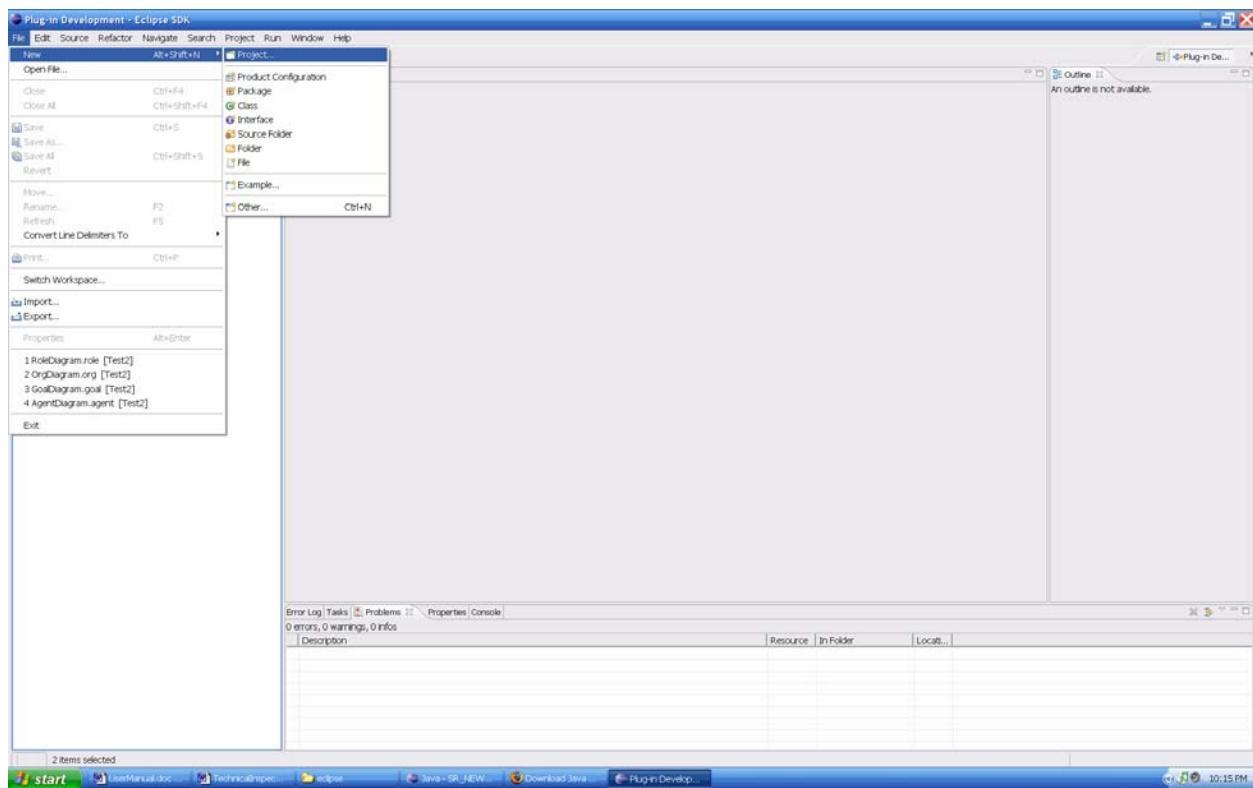




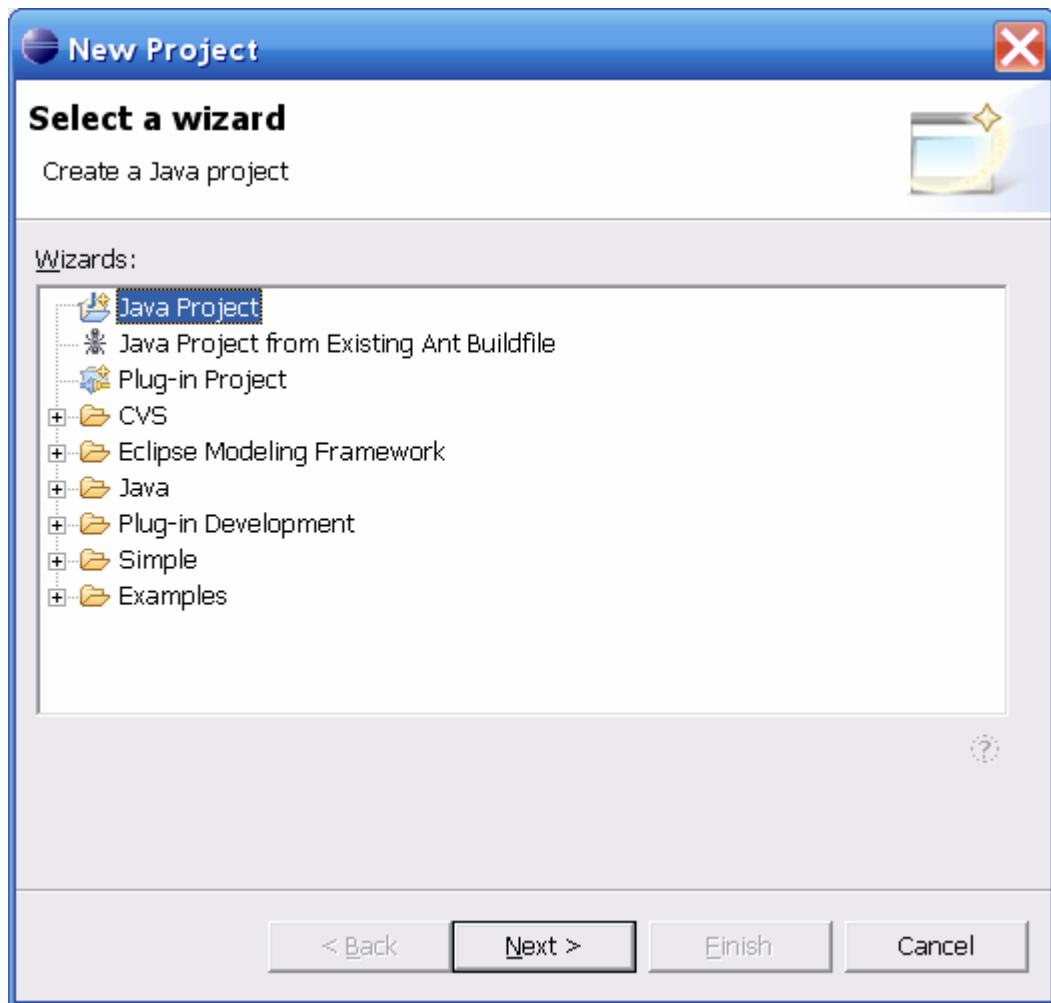
Our screen now looks like this. Select Run located on the bottom of the page.

This will open up a new runtime workbench.

Select File, New, Project on the menu bar.

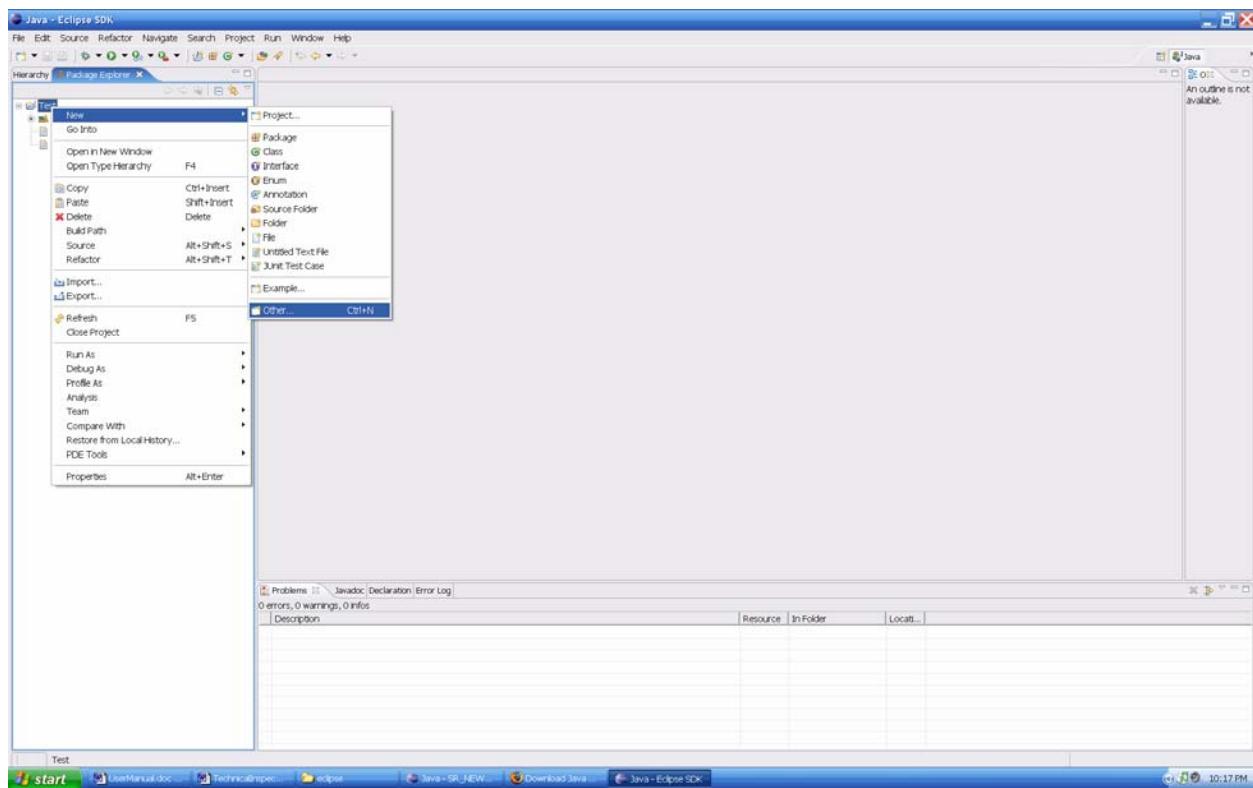


This brings up a new project wizard.

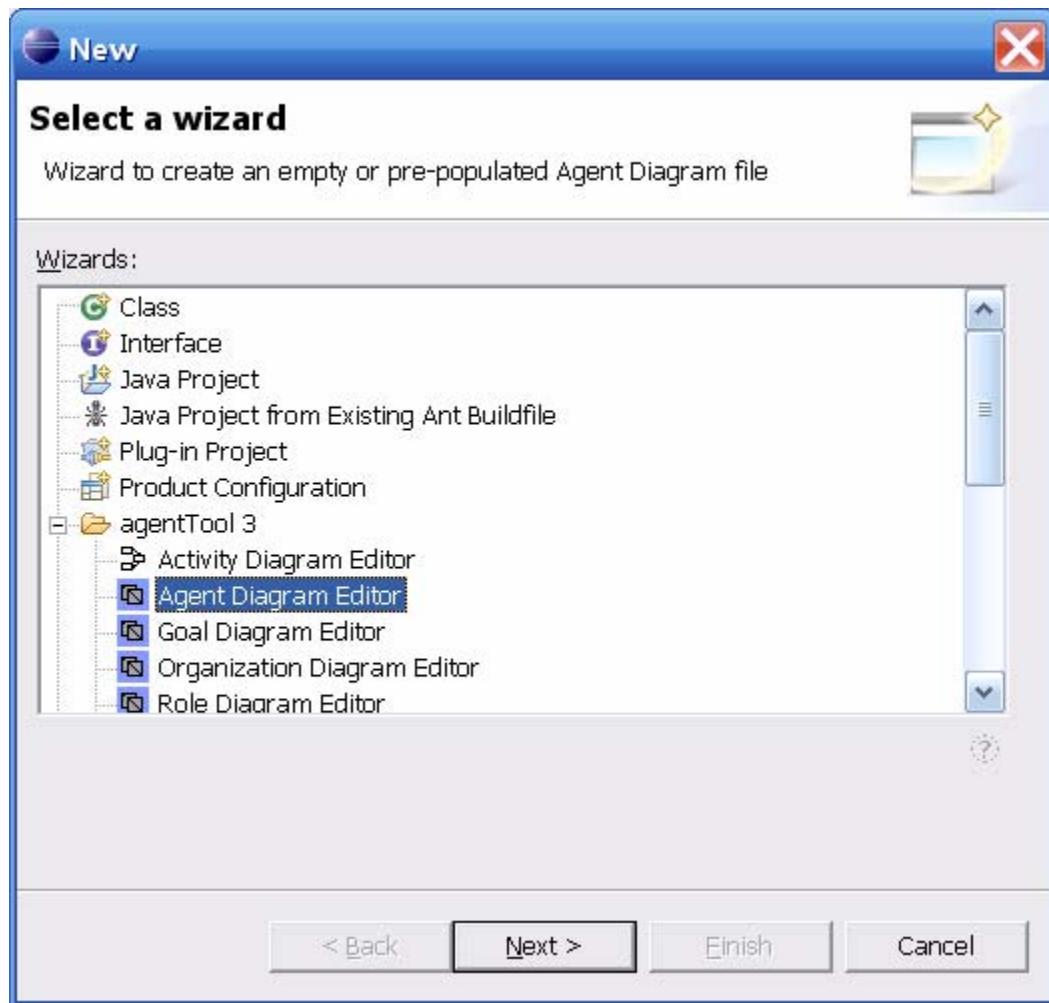


Select Next with Java Project highlighted. Name our project Test and select Finish.

Now right click our Test project and select New, Other



Expand agentTool 3 and select Agent Diagram Editor. Select Next.



After this select finish with all the default values. We just created a new Agent Diagram and it was check to make sure it was valid. We see this if we switch back to the first workbench and open the console view.

The screenshot shows the Eclipse IDE interface. The Java editor displays a file named `SR_NEW.java` with the following code:

```

package at3Validation.rules.agent;
import org.eclipse.core.resources.IResource;
public class SR_NEW extends ARule {
    public SR_NEW() {
        super();
    }
    public void run(IResource res) {
        System.out.println("Our test rule is running");
    }
}

```

The Problems view at the bottom shows the output of the `System.out.println` statement: "Our test rule is running".

Here we see that the `System.out.println` statement was executed, verifying that the rule was ran.

To check that the rule also has the capability to be turned off, select Window, Preferences in the runtime workbench. This brings up the following page with at3 Preferences and Agent Diagram Rules selected. You can see that the SR NEW is available to be deselected.

